A&S 100 SPECIAL INTRODUCTORY COURSE:  
Title to be Assigned. (1-6)  
This course permits the offering at the introductory level of special courses of an interdisciplinary, topical, or experimental nature. Each proposal must be approved by the Dean of the College of Arts and Sciences. A particular title may be offered at most twice under the A&S 100 number. Students may not repeat under the same title. May be repeated to a maximum of 12 credits. Prereq: Will be set by instructor.

A&S 103 BASIC INSTRUCTION IN LESS COMMONLY TAUGHT LANGUAGES I (Subtitle required). (3-5)  
This course provides elementary language instruction with an emphasis upon the spoken language of everyday use where appropriate. Writing and the elements of grammar are gradually introduced. Students may not repeat this course under the same subtitle. Prereq: Will be set by instructor.

A&S 104 BASIC INSTRUCTION IN LESS COMMONLY TAUGHT LANGUAGES II (Subtitle required). (3-5)  
A continuation of A&S 103. Students may not repeat this course under the same subtitle. Prereq: A&S 103.

A&S 203 INTERMEDIATE INSTRUCTION IN LESS COMMONLY TAUGHT LANGUAGES I (Subtitle required). (3-5)  
This course provides intermediate instruction in a less commonly taught language. Development of speaking, listening, reading, and writing skills, as appropriate, will be stressed. Students may not repeat this course under the same subtitle. Prereq: A&S 104 in the same language or permission of instructor.

A&S 204 INTERMEDIATE INSTRUCTION IN LESS COMMONLY TAUGHT LANGUAGES II (Subtitle required). (3-5)  
A continuation of A&S 203. Students may not repeat this course under the same subtitle. Prereq: A&S 203 in the same language or permission of the instructor.

A&S 300 SPECIAL COURSE. (1-3)  
Interdisciplinary, topical or experimental courses to be approved by the Dean of the College of Arts and Sciences. A particular course may be offered at most twice under the A&S 300 number, and no A&S 300 course may be given for more than three credits per semester. Open to all University students, subject to such limits or prerequisites as set by the instructor.

A&S 301 MINI-COLLEGE IIIB: (TWO SUBTITLES REQUIRED). (1-5)  
A course for sophomores enrolling in a mini-college. Students may enroll in up to nine (9) hours of A&S mini-college credit concurrently, as required by the mini-college. Prereq: Enrollment in a designated UK mini-college.

A&S 302 MINI-COLLEGE IVB: (TWO SUBTITLES REQUIRED). (1-5)  
A course for sophomores enrolling in a mini-college. Students may enroll in up to nine (9) hours of A&S mini-college credit concurrently, as required by the mini-college. Prereq: Enrollment in a designated UK mini-college.

A&S 500 SPECIAL COURSE (Subtitle required). (1-3)  
Interdisciplinary, topical, or experimental courses to be approved by the Dean of the College of Arts and Sciences and the Dean of the Graduate School. A particular course may be offered at most twice under the A&S 500 number. Open to all university students, subject to such limitations or prerequisites as set by the instructor. Prereq: As specified by the instructor.

A-E Art Education

A-E 270 INTRODUCTION TO ART EDUCATION. (2)  
A lecture-laboratory course investigating the theoretical, historical, psychological and sociological foundations of art education. Critical examination of individual and group activities currently offered in the elementary school art program. Lectures, curriculum design, evaluation of process and technique. Introduction to the visual arts through studio experiences. Lecture, one hour; laboratory, two hours per week. A-E 270 and A-E 272 together satisfy the state art requirement for general elementary teacher certification. Prereq: EDP 202.

A-E 272 WORKSHOP IN DESIGN EDUCATION. (2)  
Exploration and analysis of design, media and concepts with special attention to classroom application. Lecture, one hour; laboratory, two hours per week. Prereq: A-E 270.

A-E 395 INDEPENDENT WORK: ART EDUCATION. (1-3)  
Supervised individual research, practicum, and field experience leading to the development of art education curriculum theory, and teaching techniques appropriate for various populations and conditions. A learning contract will be submitted to both the department and to the office of the dean at the time of registration. May be repeated to a maximum of six credits. Prereq: Major and consent of instructor.

A-E 399 EXPERIENTIAL EDUCATION. (1-15)  
Development of personally motivated and planned projects and internships in art education and interdisciplinary program activities outside the academic classroom experience, encompassing recreation, general education, adult education, special education, state programs, and group field experiences and workshops. May be repeated to a maximum of 15 credits. (Approval of A&S dean required for more than six credits per semester.) Prereq: Recommendation of art faculty member and department chairman; completion of departmental learning agreement.

A-E 515 INTRODUCTION TO ART THERAPY. (3)  
An examination of various historical and contemporary conceptions of the therapeutic function and value of art from an art education perspective. The impact of art experience on emotional, intellectual and behavioral development and/or rehabilitation will be explored through readings, discussions, guest lectures, and lab experiences. Lecture, two hours per week; laboratory, two hours per week. Prereq: PSY 331 and major or consent of instructor.

A-E 525 THE ELDERLY AND THE ARTS. (3)  
An examination of the problems of the elderly and the possibilities of art education for older persons in various settings including nursing homes, day care and recreation centers, housing complexes, and continuing education programs. The impact of art experience on the psychological, social, and physical well-being of the older person and the initiation of quality programs in the arts will be explored through readings, lectures, demonstrations, and field experience. Lecture, two hours; laboratory, two hours.

A-E 538 ADVANCED ARTS AND CRAFTS IN THE ELEMENTARY SCHOOL. (3)  
Planned to give the elementary teacher an understanding of teaching methods involved in, and construction of, art activities which would enrich the classroom program.

A-E 545 TOPICAL STUDIES IN ART EDUCATION (Subtitle required). (3)  
Intensive study and analysis of a designated topic, issue or development in the philosophy, history, or methodology of art education in community and public school settings. May be repeated to a maximum of six credits. Prereq: Art education major or consent of the instructor.

A-E 577 ART IN SECONDARY SCHOOLS. (3)  
This course provides students with an overview of the secondary school in American education and explores the history, theory, techniques and contemporary issues of teaching art in the secondary schools. Skills in the planning of multicultural activities and the teaching and evaluation of secondary art experiences are stressed. Full class instruction, video, micro-teaching, laboratory and studio experiences are incorporated into class design. Prereq: Major in art education or consent of the instructor.

A-E 578 ART IN ELEMENTARY SCHOOLS. (3)  
Study of perceptual and aesthetic awareness in children. Field and practicum experiences with methods and materials appropriate to the teaching of art in the elementary school. Multicultural activities stressed. Lesson planning, curriculum design, evaluation, teaching skills, classroom safety, multicultural activities included: lecture, demonstration, micro-teaching laboratory and studio experiences. Prereq: Major in art education, or consent of the instructor.

A-E 579 SEMINAR IN ART EDUCATION. (2)  
Inquiry into the relationship of current philosophies of art education and aesthetics; a consolidation of art education ideas with a formation of criteria for making value judgments; the development of a personal viewpoint consistent with education and art as humanistic endeavors. Prereq: Major in art education, or consent of the instructor.

A-E 645 TOPICAL RESEARCH IN ART EDUCATION (Subtitle required). (3)  
Advanced study and research of a designated topic, issue, or development in the philosophy, history, or methodology of art education in community and public school settings. May be repeated to a maximum of six credits. Prereq: Graduate standing in art education.

A-E 670 SCHOOL AND COMMUNITY ART. (3)  
Analysis of the social function of art; organization of school and community related programs in art; case studies of existing programs. Field experience, educational involvement. Lectures and demonstrations. Prereq: Major in art education or consent of instructor.

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KEY: # = new course  * = course changed  † = course dropped
A-H 105 ANCIENT THROUGH MEDIEVAL ART. (3)
Survey of the development of art and architecture with primary emphasis on cultures of Egypt, Western Asia, Greece, Rome, and medieval Europe.

A-H 106 RENAISSANCE THROUGH MODERN ART. (3)
Historical development of Western art and architecture from the fourteenth century through the present.

* A-H 307 ANCIENT NEAR EASTERN AND EGYPTIAN ART. (3)
Study of the art, architecture, and material culture of the civilizations in the ancient Near East (Mesopotamia, Assyria, Persia) and of Egypt, from Neolithic origins through the first millennium BCE. Prereq: A-H 105 recommended.

# A-H 308 AFRICAN ART. (3)
A study of African art: the philosophy and myths that govern the people's art production. These philosophies and myths, in most cases, will be compared to the western point-of-view of thinking about art and art production. Prereq: A-H 106 recommended.

† A-H 309 OLD KINGDOM EGYPT.

† A-H 311 GREECE: FROM THE DARK AGES INTO HISTORY.

* A-H 312 ART OF GREECE. (3)
Study of the art and architecture of Greece from Mycenaean through Hellenistic times. Emphasis will be on interpreting the arts of Greece of the 5th and 4th centuries B.C. in the context of the political, social, and intellectual life of Classical Athens. Prereq: A-H 105 recommended. (Same as CLA 312.)

A-H 313 ROMAN ART. (3)
Study of the art and architecture of Rome from the early Republic through the age of Constantine. Attention will focus on painting, sculpture and architecture as reflections of political, social and cultural developments in the Roman world. Prereq: A-H 105 recommended. (Same as CLA 313.)

† A-H 320 EARLY MEDIEVAL ART.

† A-H 321 ROMANESQUE AND GOTHIC ART.

A-H 322 BYZANTINE ART. (3)
Study of the art forms of Byzantium (the Eastern Medieval Empire) from its origins in Late Antique and Early Christian art to its final demise in 1453. Emphasis on the continuity and transformation of the classical tradition and on the innovations peculiar to Byzantine art within its religious, imperial, and social context. Prereq: A-H 105 recommended.

# A-H 323 WESTERN MEDIEVAL ART. (3)
Examination of the art and architecture of Western Europe from the fourth through the fifteenth centuries CE (Common Era). Considers the interrelationships of art, religion, literature, politics, and other expressive forms as they shape and are shaped by the visual arts communicating the ideas of medieval patrons and artists. Prereq: A-H 105 recommended.

† A-H 330 ITALIAN RENAISSANCE ART.

† A-H 331 NORTHERN EUROPEAN RENAISSANCE ART.

# A-H 334 RENAISSANCE ART. (3)
Study of art and architecture in Italy and Northern Europe from C. 1300-1520. Art is interpreted in the context of the social, political, and intellectual life of the Renaissance. Prereq: A-H 106 recommended.

* A-H 335 MANNERIST AND BAROQUE ART. (3)
Study of European art and architecture of the Mannerist and Baroque periods, with primary emphasis on Baroque. Baroque art is examined in the social, political, and intellectual contexts of individual regions to distinguish regional differences as well as cultural interrelationships. Prereq: A-H 106 recommended.

* A-H 340 MODERN ART I: 18TH AND 19TH CENTURIES. (3)
A study of the visual arts in the eighteenth and nineteenth centuries with emphasis on their historical and cultural background, and interdisciplinary connections in the arts and humanities, especially in Europe. Prereq: A-H 106 recommended.

A-H 341 MODERN ART II: TWENTIETH CENTURY ART. (3)
Examination of the visual arts from the 1800s to the present with emphasis upon Europe and North America. Major developments in painting and sculpture (and to a lesser extent, design, architecture, film, and performance) are analyzed in their contemporary social, intellectual, and political contexts. Prereq: A-H 106 recommended.

A-H 342 AMERICAN ART. (3)
A chronologically organized examination of the visual arts of the peoples of the United States from the colonial period to the present. Different genres of art, the changing roles of artists, and the emergence of art institutions and audiences for art are explored within the context of democratic public life in the United States. Prereq: A-H 106 recommended.

* A-H 343 HISTORY OF PHOTOGRAPHY. (3)
Chronological survey of the history of photography from its inception to the present day. Emphasis on fine art photography, the work and contributions of its practitioners, the relationship of photography to other art forms, general issues within the medium. Prereq: A-H 106 recommended.

† A-H 350 CONTEMPORARY ART. (3)
Through lectures, readings, discussions, and research, this course examines major issues raised in art and art criticism since 1965. Particular attention is given to the impact of social, intellectual, and technological developments upon art making and concepts of art and the artist. Prereq: A-H 106 recommended.

† A-H 390 TOPICAL RESEARCH IN ART HISTORY.

† A-H 395 INDEPENDENT WORK: ART HISTORY. (1-15)
A community-based or field-based experience in Art History. A formal learning contract among student, field supervisor, and supervising faculty member required. May be repeated to a maximum of 15 hours. Prereq: A-H 105 and A-H 106.

# A-H 501 MUSEUM STUDIES I: INTRODUCTION. (3)
An introduction to the varied types of professional activity found within the typical university or regional art museum. Intended for advanced students in arts related disciplines. Team taught in the seminar format in the University of Kentucky Art Museum by a member of the art history faculty and the UK Art Museum staff. Prereq: Junior standing.

# A-H 502 MUSEUM STUDIES II: INTERNSHIP. (3)
A supervised internship in a professional museum setting that builds upon Museum Studies I. The focus may be on a single aspect or several areas of museum activity: administration, curatorship, education, registration and collection management, design, development, public relations, etc. Laboratory, 10 hours per week. May be repeated to a maximum of 9 credits within different contexts. Prereq: Completion of A-H 501 with a grade of B or better.

# A-H 503 ART HISTORY THROUGH THE ART OBJECT (Subtitle required). (3)
Examination of original works of art on campus or in regional collections within an art historical context. The course may focus on a particular medium, class or objects, period, or artist. May be repeated up to 6 credits with different course subtitles. Prereq: Junior standing.

† A-H 510 STUDIES IN ANCIENT ART.

† A-H 511 PREHISTORIC EGYPT.

† A-H 520 STUDIES IN MEDIEVAL ART.

# A-H 525 STUDIES IN GENRES AND MEDIA (Subtitle required). (3)
Study of a particular genre (type of subject, such as still life) or a particular medium (type of object, such as the icon) in the history of art. May be repeated to a maximum of 6 credits when identified by a different subtitle. Prereq: Junior standing.
A-H 526 ART AND THE ARTIST IN SOCIETY  
(Subtitle required)  
(3)  
Art historical study of a topic or period with particular emphasis on artists and the social and cultural context of their roles in the production of visual art forms. May be repeated to a maximum of 6 credits when identified by a different subtitle. Prereq: Junior standing.

A-H 527 ART WITHIN ITS INTERDISCIPLINARY FRAMEWORK  
(Subtitle required)  
(3)  
Art historical study of a topic or period with particular emphasis placed on establishing the interdisciplinary connections for visual art forms. Depending on the topic, students might research in a wide variety of areas over the course of the semester, for example, literature, music, theatre, history, political science, philosophy, the classics, anthropology, etc. May be repeated to a maximum of 6 credits when identified by different subtitles. Prereq: Junior standing.

A-H 528 TOPICAL SEMINAR IN ART HISTORY  
(Subtitle required)  
(3)  
In-depth study of a work of art, a particular artist, an artistic period, or an iconographic or thematic study. May be repeated up to six credits with different subtitles. Prereq: Junior standing.

†A-H 530 STUDIES IN RENAISSANCE ART.  
(3)  
†A-H 540 STUDIES IN MODERN ART.  
(3)  
†A-H 550 ART HISTORY SEMINAR.  
†A-H 590 TOPICAL STUDIES IN ART HISTORY.  
A-H 592 AESTHETICS.  
(3)  
Problems of method in aesthetics; major types of aesthetic theory. Aesthetic materials of the arts, in literature, music, and the space arts. Form and types of form. Meaning in the arts. Interrelations of the arts. (Same as PHI 592.)

A-H 598 COORDINATE STUDY.  
(3)  
Course number for those students wishing to do advanced work on a special subject in conjunction with a regularly scheduled 300-level class not previously taken by the student. May be repeated to a maximum of six credits. Prereq: Two art history courses or consent of instructor.

A-H 610 PROBLEMS IN ANCIENT ART.  
(3)  
Intensive study of a limited typological or historical problem as an introduction to the methodology of original research. Students will give evidence of knowledge of appropriate bibliography and present the results of their research in forms previously agreed upon with the instructor. May be repeated to a maximum of six credits. Prereq: Eighteen credit hours drawn from ancient history, classical languages and literatures, anthropology, and/or art history.

A-H 620 PROBLEMS IN MEDIEVAL ART.  
(3)  
Research and analysis in selected topics of history from the late Antiquity-Early Christian period through the 15th century. Readings, discussion, formal presentation of research. May be repeated to a maximum of six credits. Prereq: Eighteen credits in art history or consent of instructor.

A-H 630 PROBLEMS IN RENAISSANCE ART.  
(3)  
Intensive study of a topic or problem from art of the 14th through 17th centuries. Individual research as training in historical methodology and formal presentation of this research will be required. May be repeated to a maximum of six credits. Prereq: Eighteen credits in art history or consent of instructor.

A-H 640 PROBLEMS IN MODERN ART.  
(3)  
Investigation of particular critical and historical problems in the visual arts from the 18th century to the present. Lectures, discussion, original research, and critiques. May be repeated to a maximum of nine credits. Prereq: Eighteen credits in art history or consent of the instructor.

A-H 690 TOPICAL PROBLEMS IN ART HISTORY.  
(3)  
Investigation of special critical and historical problems crossing the customary period divisions of art history. Lectures, discussion, original research, and critiques. May be repeated to a maximum of six credits. Prereq: Eighteen credits in art history or consent of instructor.

A-H 748 MASTER’S THESIS RESEARCH.  
(0)  
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

A-H 780 INDEPENDENT WORK: ART HISTORY.  
(1-3)  
Supervised and sustained individual research and interpretation in the history of art leading to the discovery and demonstration of new knowledge. A formal learning contract between student and supervising faculty member required. May be repeated to a maximum of six credits. Prereq: Graduate standing in the department, 18 credits in art history and consent of instructor.

A-S Art Studio  
A-S 102 VISUAL EXPLORATION I.  
(3)  
Introductory studio experience in two-dimensional representation and abstraction using a variety of basic drawing materials and processes. Six studio hours per week.

A-S 103 VISUAL EXPLORATION II.  
(4)  
Introductory studio experience in three dimensional representation and abstraction. A variety of sculptural materials and basic shop processes will be studied. Eight studio hours per week.

A-S 200 STUDIO I.  
(3)  
Studio investigation of recent ideas, values, and directions in Art introduced through a variety of traditional and nontraditional processes, materials, and methods. Nine studio hours per week. Prereq: A-S 102 and 103.

A-S 202 FIGURE DRAWING.  
(3)  
The human figure will be explored as a source for drawing. All two-dimensional techniques and modes of forming, both traditional and contemporary-experimental, will be used. Studio, eight hours; one hour by appointment. Prereq: A-S 102 or consent of instructor.

A-S 215 STUDIO II.  
(3)  
Continued studio experience emphasizing the descriptive and expressive function of shape and color in visual organization using two dimensional marking and shaping materials and processes. Nine studio hours per week. Prereq: A-S 102.

A-S 255 STUDIO III.  
(3)  
Continued studio experience in three dimensional expression, emphasizing design and technical development, including modeling, mold making, fabrication and assembly in a variety of materials. Nine studio hours per week. Prereq: A-S 103.

A-S 310 PAINTING I.  
(3)  
Concentrated painting experience stressing enlargement of formal understanding and personal expression. Prereq: A-S 215 or consent of instructor.

A-S 311 PAINTING II.  
(3)  
A continuation of A-S 310. Prereq: A-S 310 and consent of the instructor.

A-S 320 PRINTMAKING I.  
(3)  
Introductory studio experience in printmaking media and procedures relevant to individual development. Nine studio hours per week. Prereq: A-S 102 or consent of instructor.

A-S 321 PRINTMAKING II.  
(3)  
A continuation of A-S 320. Nine studio hours per week. Prereq: A-S 320 or consent of instructor.

A-S 330 INTERMEDIATE DRAWING.  
(3)  
Continued studio experience in two-dimensional representation and abstraction using a variety of drawing materials and processes. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 102 or consent of instructor.

A-S 340 GRAPHIC DESIGN I.  
(3)  
Introductory studio experience in the application of visual design to graphic communication. Nine studio hours per week. Prereq: A-S 102 and A-S 103, or consent of instructor.

A-S 341 GRAPHIC DESIGN II.  
(3)  
Continued exposure to the aesthetics and principles of design and their creative application in visual communication. Class projects will develop sensibilities gained in A-S 340 such as the use of type as a spatial element; selection of typefaces, hand-lettering, and graphic imagery. Mass production procedures and techniques will be introduced. Studio, nine hours per week. Prereq: A-S 340.
A-S 350 FIBER I. (3)
Introductory studio experience to the design and fabrication of woven and non-woven fiber art in two and three dimensions; emphasis on color, structure and related aesthetic values. Nine studio hours per week. Prereq: A-S 102 or A-S 103 or consent of instructor.

A-S 351 FIBER II. (3)
Continuation of A-S 350, emphasis on developing perceptual and technical skills toward increasing aesthetic involvement with woven and nonwoven fiber and fabric. Nine studio hours per week. Prereq: A-S 350 or consent of instructor.

A-S 360 SCULPTURE I. (3)
Concentrated sculptural experience in a variety of media emphasizing expanded understanding of material and methods. Nine studio hours per week. Prereq: A-S 255 or consent of instructor.

A-S 361 SCULPTURE II. (3)
A continuation of A-S 360. Nine studio hours per week. Prereq: A-S 360 or consent of instructor.

A-S 370 CERAMICS I. (3)
Introductory studio experience to a variety of ceramic materials and processes. Nine studio hours per week. Prereq: A-S 103 or consent of instructor.

A-S 371 CERAMICS II. (3)
A continuation of A-S 370. Nine studio hours per week. Prereq: A-S 370 or consent of instructor.

A-S 380 PHOTOGRAPHY I. (3)
A-S 380 is an introductory course in photography. Although it provides a thorough background in basic techniques that students may apply to any discipline, its primary emphasis is upon the practice of the medium as a fine art. Students receive technical instruction in camera and lens construction, exposure controls, processing of black and white negatives and prints, and presentation. Studio, nine hours per week.

A-S 381 PHOTOGRAPHY II. (3)
A-S 381 is a continuation of A-S 380. The emphasis is upon refining visual perception and basic photographic skills with an introduction to some of the more advanced techniques of black and white photography. Students receive technical instruction in the Zone System, archival processing, toning, and presentation. Studio, nine hours per week. Prereq: A-S 380 or consent of instructor.

A-S 384 COLOR PHOTOGRAPHY I. (3)
A-S 384 is an introductory course in color photography. The emphasis is upon the unique qualities of color photography relative to visual perception. Students receive technical instruction in negative and transparency film development and printing. Studio, nine hours per week. Prereq: A-S 380 or consent of instructor.

A-S 386 NONSILVER PHOTOGRAPHY I. (3)
A-S 386 is an introductory course in nonsilver photography. The emphasis is upon the unique qualities of nonsilver photography relative to visual perception. Students receive technical instruction in the use of orthochromatic films, half-tone separations, cyanotypes, Van Dyke brown prints, and gum-bichromate prints. Studio, nine hours per week. Prereq: A-S 380 or consent of instructor.

A-S 390 TOPICAL STUDIES (Subtitle required). (3)
Studio investigation of art forms, processes, and topics not specially treated in the regular studio course of study. Topics announced in schedule book for each semester. Nine studio hours per week. May be repeated to a maximum of 12 credits when identified by different course subtitles. Prereq: To be specified as appropriate when topic is identified.

A-S 395 INDEPENDENT WORK: ART STUDIO. (1-3)
Supervised individual work in Art Studio. A learning contract will be submitted both to the department and the office of the dean at the time of registration. May be repeated to a maximum of nine credits. Prereq: Art major, senior standing, grade-point average of 3.0 within the department and consent of instructor.

A-S 396 WORKSHOP (Subtitle required). (1-6)
Workshops in a variety of media dealing with supervised investigation of Art-Studio problems. Studio, 3-18 hours per week. May be repeated to a maximum of nine credits when identified by different subtitles. Prereq: Consent of instructor.

A-S 398 COORDINATED STUDIES IN ART STUDIO. (3)
Supervised independent study in conjunction with regularly scheduled upper-division classes. Coordinate study credits may not be attached to any upper-division course in which the student is concurrently enrolled. Studio, nine hours per week. May be repeated to a maximum of nine credits. Prereq: Art major, junior standing or above, grade-point average of 3.0 in the department.

A-S 399 EXPERIENTIAL EDUCATION. (1-15)
Off-campus studio experience outside the academic environment leading to significant professional growth. A formal learning contract among student, field supervisor and the department. Studio hours per week by arrangement. May be repeated to a maximum of 15 credits. Prereq: Upper division standing; written statement of objective, recommendation of a studio faculty member and the approval of the department chairperson and the Office of Experiential Education.

A-S 490 SENIOR SEMINAR. (1)
Readings and critical discussion relating to art. Selection, preparation, and presentation of senior exhibitions and portfolios. To be taken during student’s final year of study. Two lecture hours per week. Prereq: Senior standing in Department of Art.

A-S 510 PAINTING III. (3)
Supervised individual development in painting. Nine studio hours per week. Prereq: A-S 311 or consent of instructor.

A-S 511 PAINTING IV. (3)
Continuation of A-S 510; emphasis on professional awareness and development. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 510 or consent of instructor.

A-S 520 PRINTMAKING III. (3)
Supervised individual development in printmaking. Nine studio hours per week. Prereq: A-S 321 or consent of instructor.

A-S 521 PRINTMAKING IV. (3)
Continuation of A-S 520; emphasis on professional awareness and development. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 520 or consent of instructor.

A-S 530 ADVANCED DRAWING. (3)
Supervised individual development in drawing. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 330 or consent of instructor.

A-S 540 GRAPHIC DESIGN III. (3)
The analysis of popular graphic formats and their relationship to current ideas in painting and photography, stressing experiences gained by the student in other art-studio classes. Additional emphasis on practical considerations in developing visual communication design problems from initial concept to finished artwork. Exploration of specification procedures as they relate to printing papers, typesetting, and photographic methods. Studio, nine hours per week. Prereq: Successful admission to BFA program.

A-S 550 FIBER III. (3)
Supervised individual development in fiber. Nine studio hours per week. Prereq: A-S 351 or consent of instructor.

A-S 551 FIBER IV. (3)
Continuation of A-S 550; emphasis on professional awareness and development. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 550 or consent of instructor.

A-S 560 SCULPTURE III. (3)
Supervised individual development in sculpture. Nine studio hours per week. Prereq: A-S 361 or consent of instructor.

A-S 561 SCULPTURE IV. (3)
Continuation of A-S 560; emphasis on professional awareness and development. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 560 or consent of instructor.

A-S 570 CERAMICS III. (3)
Supervised individual development in ceramics. Nine studio hours per week. Prereq: A-S 371 or consent of instructor.

A-S 571 CERAMICS IV. (3)
Continuation of A-S 570; emphasis on professional awareness and development. May be repeated to a maximum of six credits. Nine studio hours per week. Prereq: A-S 570 or consent of instructor.

A-S 580 PHOTOGRAPHY III. (3)
A-S 580 is a continuation of A-S 381. The emphasis is upon advanced black and white photographic processes and continued acquisition of skills for self-expression through the medium. Students receive technical instruction in the use of different photographic films, papers, and chemicals, as well as master printing processes. Studio, nine hours per week. Prereq: A-S 381 or consent of instructor.
A-S 581 PHOTOGRAPHY IV.  (3)
A-S 581 is a continuation of A-S 580. The emphasis is upon advanced black and white photographic processes and continued acquisition of skills for self-expression through the medium. May be repeated to a maximum of six credits. Studio, nine hours per week. Prereq: A-S 580 or consent of instructor.

A-S 584 COLOR PHOTOGRAPHY II.  (3)
A-S 584 is a continuation of A-S 384. The emphasis is upon advanced color photographic processes and continued acquisition of skills for self-expression through the medium. May be repeated to a maximum of six credits. Studio, nine hours per week. Prereq: A-S 384 or consent of instructor.

A-S 586 NONSILVER PHOTOGRAPHY II.  (3)
A-S 586 is a continuation of A-S 386. The emphasis is upon advanced nonsilver photographic processes and continued acquisition of skills for self-expression through the various media. May be repeated to a maximum of six credits. Studio, nine hours per week. Prereq: A-S 586 or consent of instructor.

A-S 596 WORKSHOP.  (1-6)
Workshops in a variety of media dealing with supervised investigation of advanced art studio problems. Prereq: Consent of instructor.

A-S 610 PAINTING V.  (3)
Advanced studio investigation of current ideas in painting. Exploration of contemporary and traditional procedures, materials, and issues in a context of a group discussion and review. May be repeated to a maximum of nine credits. Prereq: Graduate standing in the department and approval of the instructor.

A-S 611 PAINTING VI.  (3)
Continued studio investigation of current ideas in painting, with increased concentration on critical group discussions of student work and readings in contemporary art. May be repeated to a maximum of nine credits. Prereq: Graduate standing in the department and consent of the instructor.

A-S 620 PRINTMAKING V.  (3)
Advanced studio investigation of current ideas in printmaking. Exploration of contemporary and traditional procedures, materials, and issues. May be repeated to a maximum of nine credits. Studio, nine hours. Prereq: A-S 610 and consent of instructor.

A-S 621 PRINTMAKING VI.  (3)
Continued advanced studio investigation of current ideas in printmaking. Increased concentration of technical and aesthetic development in preparation for entry into the professional environment. May be repeated to a maximum of nine credits. Studio, nine hours. Prereq: Graduate standing in the department and consent of the instructor.

A-S 630 GRADUATE DRAWING.  (3)
Supervised studio course in graduate-level drawing and mixed media works on paper or other two-dimensional surfaces. Emphasis will be placed on personal style, its identification, definition and further development in the context of major directions in the fiber arts. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 650 FIBER V.  (3)
In this supervised graduate studio course in fiber, emphasis will be placed on personal style, its identification, definition, and further development in the context of major directions in the fiber arts. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 660 SCULPTURE V.  (3)
In this supervised studio course in sculpture, emphasis will be placed on personal style, its identification, definition, and further development in the context of direction in modern ceramics. Studio, nine hours per week. May be repeated to a maximum of nine credits. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 670 CERAMICS V.  (3)
In this supervised studio course in graduate ceramics, emphasis will be placed on personal style, its identification, definition, and further development in the context of direction in modern ceramics. Studio, nine hours per week. May be repeated to a maximum of nine credits. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 671 CERAMICS VI.  (3)
Continued advanced studio investigation of current ideas in ceramics, increased concentration on technical and aesthetic development, professional readings, and group discussions. Studio, nine hours per week. May be repeated to a maximum of nine credits. Prereq: A-S 670.

A-S 680 PHOTOGRAPHY V.  (3)
A-S 680 is a continuation of A-S 581. In this supervised studio course in graduate photography, emphasis will be placed on technical style, its identification, definition, and further development in the context of major directions in photography. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: A-S 581 and consent of instructor.

A-S 681 PHOTOGRAPHY VI.  (3)
A-S 681 is a continuation of A-S 680. The emphasis will be upon continued advanced studio investigation of current ideas in photography with increased concentration on technical and aesthetic development, professional readings, and group discussion. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: A-S 680 and consent of instructor.

A-S 710 PROBLEMS IN PAINTING.  (3)
Sustained individual projects focusing on problems and experimental work in the technical and theoretical aspects of painting. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 720 PROBLEMS IN PRINTMAKING.  (3)
Sustained individual projects focusing on problems and experimental work in the technical and theoretical aspects of printmaking. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 730 PROBLEMS IN DRAWING.  (3)
Sustained individual projects focusing on problems and experimental work in the technical and theoretical aspects of drawing. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 740 PROBLEMS IN FIBER.  (3)
Sustained individual problems and experimental work in the technical and theoretical problems of fiber. May be repeated two times to a maximum of nine credits. Nine studio hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 750 PROBLEMS IN SCULPTURE.  (3)
Sustained individual problems and experimental work in the technical and theoretical problems of sculpture. May be repeated to a maximum of nine credits. Nine studio hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 767 M.F.A. STUDIO THESIS PROJECT.  (1-6)
Independent research and preparation for the M.F.A. thesis exhibition. For the student working in a highly technical medium or process, the preparation of a correlated written thesis under close guidance will be the outcome. The student will be expected to know the standard forms for photographic records and the preparation of a professional portfolio. May be repeated to a maximum of six credits. Prereq: Normally taken during final semester for graduate study.

A-S 770 PROBLEMS IN CERAMICS.  (3)
Sustained individual problems and experimental work in the technical and theoretical problems of ceramics. May be repeated two times for a maximum of nine credits. Nine studio hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.

A-S 779 PROBLEMS IN PHOTOGRAPHY.  (3)
A-S 779 emphasizes sustained individual problems and experimental work in the technical and theoretical problems of photography. May be repeated to a maximum of nine credits. Studio, nine hours per week. Prereq: Twelve credits in upper division studio work and consent of instructor.
### AAS African-American Studies

**AAS 200 INTRODUCTION TO AFRICAN-AMERICAN STUDIES.** (3)

An interdisciplinary course which establishes the intellectual context for an examination of the African-American experience; it introduces students to the various approaches scholars use to analyze that experience. This course employs a topological framework which permits focus on issues reflecting the diversity and richness of African-American experience across geographic boundaries.

**AAS 400 SPECIAL TOPICS IN AFRICAN-AMERICAN STUDIES (Subtitle required).** (3)

Detailed investigation of a particular topic in African-American Studies, with emphasis both on content and existing research. Topics will vary from semester to semester and are announced the preceding semester. May be repeated to a maximum of six credits when identified by a different subtitle. Prereq: Twelve hours of African-American Studies minor courses, including AAS 200.

**AAS 401 INDEPENDENT READING AND RESEARCH IN AFRICAN-AMERICAN STUDIES.** (3)

For African-American Studies minors. The student pursues a course of reading and research under the guidance of a staff member, completes a major research project, and takes an examination. A written contract defining the area of study is negotiated between student and instructor at the beginning of the course. May be repeated to a maximum of six credits. Prereq: African-American Studies minor, 12 hours of African-American Studies minor courses, including AAS 200.

### ABT Agricultural Biotechnology

**ABT 101 INTRODUCTION TO BIOTECHNOLOGY.** (1)

An introduction to biotechnology: historical perspectives, current applications and future directions. The course will consist of informal lectures and interactive discussions led by Biotechnology faculty and visiting professionals. The course will also orient students to the educational/career opportunities in Biotechnology and assist them in developing a focus for their individualized degree programs. Lecture, two hours per week. Prereq: First year or first semester transfer students in Agricultural Biotechnology.

**ABT 201 SCIENTIFIC METHOD IN BIOTECHNOLOGY.** (1)

A course designed to acquaint students with the common experimental methods used in agricultural biotechnology. Students will be presented with several case studies which demonstrate basic scientific reasoning and experimental strategies. The students will then use their understanding of basic scientific methods and agricultural systems to critically evaluate work from the current scientific literature. Each student will be required to provide a written and oral evaluation of a research project in some aspect of agricultural biotechnology. The class will provide the students with the basic skills needed for preparing their own research proposals. Prereq: ABT 101 and enrollment in the Agricultural Biotechnology degree program or consent of instructor.

**ABT 395 INDEPENDENT STUDY IN BIOTECHNOLOGY.** (1-4)

Independent study in biotechnology under the supervision of a faculty member. Prereq: Agricultural Biotechnology major and consent of appropriate instructor before registration.

**ABT 399 EXPERIENTIAL LEARNING IN BIOTECHNOLOGY.** (1-6)

An internship in biotechnology under the supervision of a faculty member. May be repeated to a maximum of six credits. Prereq: Consent of the instructor, chairperson for the Agricultural Biotechnology degree program and completion of a learning contract before registration.

**ABT 401 TECHNICAL WRITING AND PRESENTATIONS IN BIOTECHNOLOGY.** (2)

This course will focus on effective communication of ideas and research results in biotechnology. It will focus on both written presentations, in the form of research publications and research proposals, and oral presentations. The focus of this course is on student participation. Students will be required to provide both oral and written evaluations of research publications and proposals. The first part of the semester will focus on a dissection, evaluation, and discussion of recent Biotechnology-related research publications. Students will be required to provide both oral and written evaluations of the publications that are discussed. Next, they will discuss the aspects of successful oral presentations, including the effective use of visual aids. The middle of the semester will focus on preparing a research proposal, focusing on the separate components of a proposal. The end of the semester will involve student presentations of a research proposal that they have developed. These presentations will be evaluated and discussed by the other members of the class. The goal of this course is to develop skills in the evaluation of research, to provide practice in scientific writing, to prepare Biotechnology students to write their independent study research proposals and written reports, to develop oral communication skills, and to expose students to current literature and research in Biotechnology. Lecture, discussion and oral presentations. Prereq: Agricultural Biotechnology major or consent of instructor.

**ABT 495 EXPERIMENTAL METHODS IN BIOTECHNOLOGY.** (4)

A laboratory techniques course designed to give students the technical skills and understanding necessary to critically examine biological systems at the molecular level. The course will emphasize the principles of chemistry, biochemistry and molecular biology as applied to a model system for laboratory investigations. Laboratory, nine hours per week. Prereq: BIO 150 and AGR 360; or consent of instructor.

### ACC Accounting

**ACC 201 PRINCIPLES OF ACCOUNTING.** (3)

An introduction to accounting concepts and principles involved in the preparation of financial reports for internal and external use. Prereq: Sophomore standing.

**ACC 202 PRINCIPLES OF ACCOUNTING.** (3)

An introduction to the analysis and interpretation of accounting data and its use in management planning and control. Prereq: ACC 201 or BE 161 and BE 162.

**#ACC 208 CONTEMPORARY ACCOUNTING METHODS.** (3)

An introduction to basic accounting problem-solving fundamentals using a case approach. The course covers selected problem-solving methods and decision aids, presenting them in an accounting frame of reference with emphasis on team building. Unique aspects of the interpretation and communication of accounting information are explored. Prereq: ACC 201. Enrollment priority will be given to accounting and finance majors.

**#ACC 211 FINANCIAL ACCOUNTING LAB.** (1)

A laboratory-based approach to introductory financial accounting applications, with the primary focus on the accounting cycle. The primary objective is to promote an understanding of how accounting information is identified, recorded, and processed for financial reporting. Prereq: ACC 201. Enrollment priority will be given to accounting and finance majors.

**#ACC 300 FINANCIAL ACCOUNTING II.** (3)

This course is designed for non-accounting majors to provide expanded study of the impact of relevant financial accounting issues on the users of financial reporting. Topics may include financial statements; income recognition; cash and receivables; inventories; operational assets; investments; intangible assets; current liabilities; long-term liabilities emphasizing leases, pensions, postretirement benefits, and bonds; financial instruments; accounting for income taxes; and owner's equity. Prereq: ACC 201 and ACC 202.

**ACC 301 INTERMEDIATE ACCOUNTING I.** (3)

An in-depth study of valuation concepts for balance sheet accounts and income determination issues. Includes coverage of the accounting cycle, the income statement, the balance sheet, and treatments of interest, cash and receivables, inventories, and investments, plant and intangible assets, and depreciation and depletion. Prereq: ACC 202.
ACC 302 INTERMEDIATE ACCOUNTING II. (3)
Continuation of ACC 301. Includes coverage of current and long-term liabilities, stockholders equity, earnings per share, pensions, leases, income tax allocation, disclosure issues, and the statement of cash flows. Prereq: ACC 301 and ACC 324.

ACC 324 ACCOUNTING INFORMATION SYSTEMS. (3)
Fundamentals of data processing for business organizations, including manual and automated applications with emphasis on unit records, flow charts and control procedures in relation to both financial and nonfinancial data. Prereq: Six hours of accounting.

ACC 395 INDIVIDUAL WORK IN ACCOUNTING. (1-6)
Students confer individually with the instructor. Written paper usually expected and filed in chairperson’s office. May be repeated to a maximum of six credits. Prereq: GPA of 3.0 in major, approval of instructor and chairperson.

ACC 399 INTERNSHIP IN ACCOUNTING. (1)
A course designed for undergraduate accounting students who, through the Accounting Internship Director, have secured full-time, salaried, career-related positions under the supervision of a sponsoring employer. Enrollment in the course constitutes full-time status. Course may be taken on a pass-fail basis only and for no more than two consecutive semesters, repeated to a maximum of three credits. Prereq: Junior standing in accounting and approval of the Accounting Internship Director.

ACC 401G ACCOUNTING THEORY. (3)
An investigation into earlier attempts to develop a coordinated statement of accounting theory; a critical examination of selected current accounting practices; and discussion of recent developments in accounting research. Prereq: ACC 301.

ACC 403G AUDITING. (3)
The attest function of accounting with internal, independent and governmental application. Emphasis is placed on the standards and objectives of auditing and management’s responsibilities in implementing internal control. Prereq: Senior standing.

ACC 408G COST ACCOUNTING. (3)
Concepts of cost in developing information for management use in the determination of income, the selection of activities (or projects) and the measurement of performance. Prereq: ACC 202 and ACC 324 or consent of instructor.

ACC 410G NOT-FOR-PROFIT ACCOUNTING. (3)
The requirements of adequate accounting systems for various governmental units, including the recording of usual transactions and the form and content of reports. Prereq: ACC 301.

ACC 416G ACCOUNTING FOR BUSINESS COMBINATIONS. (3)
Accounting records for consolidations and mergers, preparation of consolidated statements. Insolvency and receivership records and statements. Accounting for estates and trusts. Prereq: ACC 301, 302.

ACC 417G INCOME TAXATION. (3)
A comprehensive study of the federal income tax structure with emphasis upon the taxation of individuals. Consideration will also be given to basic corporate taxation as well as to administrative procedures and research. Prereq: ACC 301 or consent of instructor.

ACC 503 ADVANCED AUDITING. (3)
A case-oriented study of current practices in public accounting including applications of statistical sampling, computer-assisted auditing and official pronouncements issued by the AICPA. This course also examines professional, ethical standards, professional liability and SEC reporting requirements. Students are expected to analyze actual case data; prepare written reports; and orally present and defend those reports. Prereq: ACC 403G.

ACC 518 CONTROLLERSHIP. (3)
A comprehensive study of the controller’s objectives, responsibilities, functions, organizational roles, etc. Prereq: ACC 408G and at least senior standing, or consent of instructor.

ACC 524 ADVANCED ACCOUNTING INFORMATION SYSTEMS. (3)
The course covers the design of accounting systems and subsystems to implement effective planning and control for a variety of business decision-making problems. Case analysis and class projects are used to accomplish the course objectives. The microcomputer is integrated in the course through a vigorous overview of existing hardware and software technology. Widely used microcomputer applications software, including database management, spreadsheet, statistical analysis, and others, is introduced and used to accomplish course objectives. Prereq: ACC 302, 324, and 403G.

ACC 577 TAXATION OF ENTITIES. (3)
A survey and analysis of the taxation of corporations, partnerships, estates, and trusts. Students who have taken any other 500, 600, or equivalent level accounting tax course may not receive credit for this course. Prereq: ACC 417G or equivalent and consent of instructor.

ACC 601 RESEARCH IN ACCOUNTING THEORY. (3)

ACC 603 ATTEST FUNCTION. (3)
A critical examination of contemporary professional attestation theory and practice including a comprehensive review of AICPA audit case studies, statements on audit procedure, and their application in simulated business situations. Prereq: ACC 403G or consent of instructor.

ACC 608 ADVANCED MANAGERIAL ACCOUNTING. (3)
Accounting procedures for the evaluation of performance in business, including the analysis of revenues and costs by projects and responsibilities and the use of budget cost studies and rates of return. Prereq: ACC 408G.

ACC 610 NOT-FOR-PROFIT AND REGULATORY ACCOUNTING. (3)
A study of the contemporary issues in the area of not-for-profit and regulatory accounting. Prereq: ACC 410G or consent of instructor.

ACC 611 PROFESSIONAL ISSUES IN ACCOUNTING. (3)
The course involves a study of issues currently impacting the accounting profession, such as regulatory agencies, standard-setting organizations, and the legal framework within which the profession functions. Prereq: 24 hours of accounting. Open only to students in the Professional Program (5-Year Program) in their fifth year or consent of instructor.

ACC 617 INCOME TAX DEVELOPMENT. (3)
A theoretical and historical approach to the study of federal income taxation with emphasis upon the public finance, legal, and accounting aspects of its development. Consideration will be given to tax research and planning as well as to the critical appraisal of the current law and proposals for its revision. Prereq: ACC 417G or consent of instructor.

ACC 619 INDEPENDENT STUDY IN ACCOUNTING. (1-3)
Designed for students undertaking special studies to be conducted in regular consultation with the instructor. Prereq: Consent of instructor.

ACC 624 ACCOUNTOMETRICS. (3)
A study of the techniques and methods available to measure and evaluate the response of sub-systems to stimuli within the total systems concept. Both the analytical and computer simulation approaches are used to displace uncertainty associated with typical business problems in which the data are generated by the accounting system. A knowledge of FORTRAN is advisable. Prereq: Six hours of accounting and ECO 391 or equivalent.

ACC 625 CORPORATE TAXATION. (3)
A detailed study of the income taxation of corporations and shareholders. Prereq: ACC 417G or consent of instructor.

ACC 626 FINANCIAL/MANAGERIAL ACCOUNTING. (3)
A study of the application of accounting information and services in the recognition or solution of management problems in business. Prereq: Graduate standing, ACC 203 or its equivalent, MA 123 or its equivalent.

ACC 633 TAXATION OF PARTNERSHIPS AND PARTNERS. (3)
A detailed study of the income taxation of partnerships and partners. Prereq: ACC 417G or consent of instructor.

ACC 647 TAXATION OF ESTATES, GIFTS, AND TRUSTS. (3)
A detailed study of the income taxation of estates, gifts, and trusts. This course will include both the estate and gift transfer taxes as well as the income taxation of trusts under Subchapter J. Prereq: ACC 417G or consent of instructor.

ACC 700 SEMINAR IN ACCOUNTANCY. (3)
An overview of accounting and accounting research, team-taught by the graduate faculty. Current developments are addressed, to include research issues in the functional areas of attestation, decision-making, financial and not-for-profit reporting, systems applications, and taxation. Prereq: Doctoral student status.
### AEC Agricultural Economics

**AEC 201 INTRODUCTION TO FARM AND NATURAL RESOURCE FINANCE.**

This course provides an introduction to basic concepts used in financial analysis that can be applied to farms and small agriculturally-related businesses. It provides an overview of basic financial statements and their role in business planning. These tools will be applied to case studies of farms, agribusiness, and forestry firms. Prereq: MA 123 and ECO 201 or ECO 202 or GEN 101.

**AEC 300 TOPICS IN AGRICULTURAL ECONOMICS (Subtitle required).**

Study in special topics in agricultural economics. May be repeated under a different subtitle to a maximum of 6 credits. A course may be offered twice under a given subtitle. Lecture, 1-3 hours; laboratory, 0-6 hours per week. Prereq: GEN 101, ECO 201.

**AEC 302 AGRICULTURAL MANAGEMENT PRINCIPLES.**

A comprehensive study of economic principles and management tools useful in farm and agribusiness decision making. A systems approach to the planning, implementation and control of the agricultural business. Specific attention to application of management and decision theory, economic principles used in decision making, and risk management strategies. Emphasis on planning the future course of the business, acquiring and managing the necessary resources, and balancing physical and financial control over the business. Lab incorporates microeconomic applications of management principles developed in lectures. Prereq: GEN 101, ECO 201.

**AEC 303 MICROECONOMIC CONCEPTS IN AGRICULTURAL ECONOMICS.**

Emphasis on the development of theoretical models of production and consumption economics and application of these models to problems. The importance of concepts of marginality to managers and consumers is emphasized. Role of risk and uncertainty in resource allocation is outlined. Prereq: GEN 101, ECO 201, MA 123 or 113.

**AEC 304 MACROECONOMIC CONCEPTS IN AGRICULTURAL ECONOMICS.**

This course addresses the concern that U.S. farmers and the food industry are increasingly affected by macroeconomic forces and general conditions in the national economy. Interdependencies between agriculture, farm size, rural economic well-being and key macroeconomic variables including interest rates, foreign exchange rates and the rate of inflation will be examined. Prereq: GEN 101, ECO 202.

**AEC 305 FOOD AND AGRICULTURAL MARKETING PRINCIPLES.**

Analysis of the market's role in determining prices and coordinating productive activities in the food and agricultural systems. Prereq: GEN 101, ECO 201.

**AEC 309 INTERNATIONAL AGRICULTURE, WORLD FOOD NEEDS AND U.S. TRADE IN AGRICULTURAL PRODUCTS.**

Present and projected world food/population balance by geographic regions; food production and world trade in agricultural products with an emphasis upon the implications for U.S. agriculture; an introduction to agricultural development problems of the less developed nations of Latin America, Africa, and Asia. Prereq: GEN 101 or equivalent.

**AEC 311 LIVESTOCK AND MEAT MARKETING.**

Provides students with a comprehensive look at the unique characteristics of the marketing system for livestock. Problems in both the feeder animal sector and the fed animal sector will be considered. Lecture, three hours per week for one-third of the semester. Prereq: AEC 301.

**AEC 312 DAIRY MARKETING.**

A comprehensive study of the unique characteristics of the marketing system for milk and milk products with emphasis on pricing at the farm level, the role of producer cooperatives and government policy and regulations. Lecture, three hours per week for one-third of the semester. Prereq: AEC 301.

**AEC 313 TOBACCO MARKETING.**

Analysis of the structure of the production and marketing system for tobacco including institutions and public regulation. Application of marketing methods and principles to tobacco. Lecture, three hours per week for one-third of the semester. Prereq: AEC 301.

**AEC 314 GRAIN MARKETING.**

Study of production and utilization of grain by areas of the world, the marketing systems for grain, and the application of economic and marketing principles to the pricing and movement of grain. Prereq: AEC 301, AEC 321.

**AEC 315 FARM SUPPLY MARKETING.**

A comprehensive analysis of the unique characteristics of the marketing system for farm supplies. Special attention is given to the structure of national and local markets, competitive behavior and pricing strategies, product quality and labeling, and logistics characteristics of various product lines. Prereq: AEC 301.

**AEC 321 AGRICULTURAL FUTURES MARKETS.**

The mechanics, theory, and practical application of hedging as related to agricultural commodities. The historical development of futures markets, functions of the futures markets, and the role of the speculator will also be explored. Prereq: AEC 301.

**AEC 324 AGRICULTURAL LAW.**

A study of legislation, administrative regulations, constitutions and court cases that have economic ramifications on agricultural and rural life. Prereq: GEN 101.

**AEC 341 AGRICULTURAL CREDIT INSTITUTIONS.**

Designed to teach applications of key segments of macro agricultural finance. The course primarily examines credit needs in agriculture and the institutions that are capable of supplying agricultural credit. Various credit instruments are identified and examined. Prereq: GEN 101.

**AEC 399 EXPERIENTIAL LEARNING IN AGRICULTURAL ECONOMICS.**

A field or community-based experience in the application of economics to agricultural and rural problems. May be repeated; a maximum of six credits allowed. Pass-fail only. Prereq: GEN 101, nine hours in agricultural economics or economics, and permission of instructor, department chairperson, and completion of learning agreement prior to registration.

**AEC 408 FARM ACCOUNTING AND BUSINESS ANALYSIS.**

Concentrates on designing a farm business financial record system and recording data pertinent to both internal and external users of financial information. Asset valuation and income determination are stressed and related to economic concepts of farm management. Prereq: AEC 302 or AEC 322; ACC 201.

**AEC 410 INTERNATIONAL TRADE AND AGRICULTURAL MARKETING.**

A study of institutional, economic and cultural factors that influence aggregate agricultural trade and exports of individual agribusinesses. Macro issues of agricultural trade policies are examined along with elements of international marketing for agricultural products. Prereq: AEC 301.

**AEC 422 AGRIBUSINESS MANAGEMENT.**

Examines and analyzes decision-making tools and problem-solving techniques available to agribusiness managers. Provides learning experience in addressing contemporary economic, marketing and management issues through case study analyses, selected readings and computerized business simulations. Prereq: AEC 301 and MGT 301.

**AEC 425 TIMBER MANAGEMENT.**

The principles of sustained yield timber management, organization of the forest area, management objectives, timber valuation, regulation of the cut, and timber management plans. Lecture, three hours; laboratory, two hours. Prereq: MA 162, FOR 201, and Summer Camp (FOR 375, 376, 377, 378, and 379), or consent of instructor. (Same as FOR 425.)

**AEC 441G AGRICULTURAL FINANCIAL MANAGEMENT.**

Applies micro agricultural finance to farm and other agricultural business firms. Reviews elementary mathematics of finance and the objectives of financial management. Uses financial statements, cash flow analysis, financial leverage and other elements in applying the theory of capital investment for making management decisions. Prereq: ACC 201, ECO 201, FIN 300.
AEC 445G INTRODUCTION TO RESOURCE AND ENVIRONMENTAL ECONOMICS. (3)
Economic analysis of the problems of assuring resource availability and environmental quality. Theoretical concepts and empirical tools for evaluating resource and environmental policy. Prereq: ECO 201, or consent of instructor.

AEC 471 INTERNATIONAL ECONOMICS. (3)
The basic exchange model is the most important topic in this course. The exchange model is used to illustrate the gains from trade, the role of opportunity costs, and the properties of relative prices. Production considerations, the concept of comparative advantage, and the resulting factor rewards are introduced. Trade distortions are introduced and studied from the point of view of protectionism and its consequences. Fixed and flexible exchange rates and the concept of balance of payments are also covered. Prereq: ECO 202 or equivalent. (Same as ECO 471.)

AEC 479 PUBLIC ECONOMICS. (3)
An application of economic analysis to the study of the role of government. Emphasis is on the reasons for and the effects of government intervention in the economy. Topics covered include: market failure, public goods and externality, welfare policy, voting and public choice, taxation, public debt and cost-benefit analysis. Prereq: ECO 202 or equivalent. (Same as ECO 479.)

AEC 483 REGIONAL ECONOMICS. (3)
This course presents an economic approach to the study of regions. The emphasis is on the role of spatial relationships in economic activity. Topics considered include market area analysis, location theory, economic base and input-output analysis as well as regional economic development. Prereq: ECO 202.

AEC 501 AGRICULTURAL MARKET ORGANIZATION AND PERFORMANCE. (3)
Analysis of the effects of the changing structure and organization of agribusiness industries on competitive behavior of firms and performance of the marketing system. Public regulation of agribusiness industries will be discussed and the effect on the market system analyzed. Prereq: AEC 301.

AEC 502 ADVANCED FARM MANAGEMENT. (3)
Integration of production and business management principles through planning and analysis for application in the management of commercial farms. The case farm approach is utilized for the application of management techniques. Prereq: AEC 302.

AEC 516 RURAL REAL ESTATE APPRAISAL. (3)
The theory, principles and procedures that a professional appraiser uses in appraising the fair market value of rural real estate. Field trips are included to apply procedures and techniques. As three to four field trips are taken, no courses should be scheduled after this one on Tuesday and Thursday. Prereq: AEC 302 or consent of instructor.

AEC 522 COOPERATIVES IN AGRIBUSINESS. (3)
An analysis of the major types of management problems faced by the agribusiness cooperative firms. Emphasis is given to alternative solutions influencing business policy decisions. Exposure to actual management problems is provided. Prereq: AEC 301; AEC 322 or MGT 301.

AEC 531 AGRICULTURAL PRICE ANALYSIS. (3)
Price behavior of agricultural products and inputs including factors affecting supply and demand for individual products, supply-price relationships and the relationship of agricultural prices to the general price level. Prereq: AEC 301 and STA 291.

AEC 532 AGRICULTURAL AND FOOD POLICY. (3)
This course surveys a variety of current public policies that influence the agricultural and rural economies. Students are exposed to the conflicting views of those concerned with food and agricultural policy issues in an international economy. Economic principles are used to evaluate alternatives in terms of the general welfare of society. Prereq: AEC 301.

AEC 580 SPECIAL PROBLEMS IN AGRICULTURAL ECONOMICS. (1-3)
Directed independent study of a selected problem. May be repeated to a maximum of six credits. Prereq: Consent of instructor and chairperson of department.

AEC 590 INTRODUCTION TO QUANTITATIVE ECONOMICS I. (3)
An introduction to mathematical approaches to economic theory. Emphasis on linear models, constrained optimization, and techniques used in comparative statics. Prereq: ECO 488G; MA 113; or consent of instructor. (Same as ECO 590.)

AEC 606 ADVANCED AGRICULTURAL MARKETING. (3)
A critical examination of objectives and results of various types of research in market organization, marketing functions, price analysis, markets over time, space and form, market information, commodity promotion programs, quality standards, and macro-economic linkages to marketing. Prereq: or concur: AEC 590 and ECO 660.

AEC 610 INTERNATIONAL TRADE IN AGRICULTURAL PRODUCTS. (3)
This course analytically examines current empirical research in the area of agricultural trade. Prereq: ECO 660, AEC 624 and ECO 671.

AEC 620 ADVANCED PRODUCTION ECONOMICS I. (3)
An advanced treatment of production economics with emphasis on flexible product and factor price situations, factor demand functions, multiple product production, and poly-periodic production theory. Prereq: ECO 660.

AEC 621 ADVANCED PRODUCTION ECONOMICS II. (3)
A continuation of AEC 620 with emphasis on production function estimation, aggregate production and supply relations, factor distribution theories and implications for agricultural policies and programs. Prereq: AEC 620.

AEC 624 ADVANCED QUANTITATIVE METHODS IN AGRICULTURAL ECONOMICS. (3)
This course uses statistical tools to model agricultural and economic systems. Subjects covered include: (1) the classical linear regression model, (2) statistical hypotheses tests, and (3) estimation techniques for single and simultaneous equation models. Prereq: ECO 488G and STA 570.

AEC 626 AGRICULTURE AND ECONOMIC DEVELOPMENT. (3)
Analytical consideration of the role of agriculture in economic development in relation to overall development strategy at various stages of growth. Theoretical and policy issues of particular relevance to the agricultural development in underdeveloped agrarian economies with various resource, social, political and economic systems. Prereq: ECO 473G or consent of instructor. (Same as ECO 674.)

AEC 627 PROJECT ANALYSIS FOR RURAL DEVELOPMENT. (3)
A study of the theory and practice of planning and analyzing public sector investments in the agricultural sector in the third world. Among the methods covered are economic analysis, financial analysis, PERT and critical path analysis. Case studies are utilized to teach methods. Prereq: ECO 660.

AEC 640 ADVANCED AGRICULTURAL POLICY. (3)
This course focuses on development of a framework to analyze alternative paradigms of the political economy. The framework focuses on the role of institutions that modify behavior of decision makers. Agricultural and food policies are evaluated in terms of the efficient use of resources and the general welfare of society. Prereq: ECO 660.

AEC 645 NATURAL RESOURCE ECONOMICS. (3)
Economic analysis of natural resource use and environmental issues. Discussion of criteria for public decision making, welfare economics, market failure, benefit-cost analysis, and benefit estimation, as applied to natural resources and the environment. Prereq: ECO 590 and ECO 660.

AEC 646 INTERTEMPORAL ALLOCATION OF NATURAL RESOURCES. (3)
This course teaches the application of economic theory to the analysis of solutions for current and prospective natural resource problems. Such understanding will be geared toward fashioning, selecting and implementing planning associated with land, water, air, biological and other natural resources and conservation of the natural environment in serving the needs and desires of citizens. Prereq: ECO 660 and AEC 590.

AEC 650 ADVANCED AGRICULTURAL PRICES. (3)
Advanced study of agricultural price behavior by the application of economic theory and statistical analysis. Prereq: AEC 624 and ECO 660.

AEC 660 RESEARCH METHODS IN AGRICULTURAL ECONOMICS. (3)
An analytical examination of research methods and techniques used in agricultural economics. Prereq: Consent of instructor.

AEC 661 PROGRAMMING MODELS IN AGRICULTURAL ECONOMICS. (3)
A study of some programming models useful in agricultural economics; includes an examination of the structure of the models themselves, economic interpretation of their components and their use in research in agricultural economics. Prereq: MA 416G and either AEC 620 or ECO 660.

AEC 691 STRUCTURE OF U.S. AGRICULTURE. (3)
This seminar will analyze the structural transformation of U.S. agriculture in the 19th and 20th centuries in the context of sociological theory. Emphasis is given to key historical transitions, changing social relations of production and state policy. Such emphasis provides a framework for understanding the historical roots and future prospects for the socioeconomic problems confronting contemporary U.S. agriculture. Prereq: Graduate standing in sociology/agricultural economics or consent of instructor. (Same as SOC 691.)
AED 748 MASTER’S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

AED 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

AEC 768 RESIDENCE CREDIT FOR MASTER’S DEGREE. (1-6)
May be repeated to a maximum of 12 hours. Prereq: Consent of adviser and chairperson of department.

AEC 769 RESIDENCE CREDIT FOR DOCTOR’S DEGREE. (0-12)
May be repeated indefinitely. Prereq: Consent of adviser and chairperson of department.

AED 780 SPECIAL PROBLEMS IN AGRICULTURAL ECONOMICS. (1-3)
Open to graduate students who have the necessary training and ability to conduct research on a selected problem. May be repeated three times for a total of nine credits. Prereq: Consent of instructor and departmental chairperson.

AED 796 SEMINAR (Subtitle required). (3)
An extended original investigation of a specific topic designed to give students experience in methods of research and an intensive study of a particular subject in the field of agricultural economics. May be repeated to a maximum of six credits under different subtitles. Prereq: Ph.D. applicant or candidate.

AED Agricultural Education

AED 210 INTRODUCTION TO VOCATIONAL EDUCATION. (3)
The history, status, philosophy, and objectives of vocational education in relation to general education. (Same as HEE 210.)

AED 362 PRACTICUM IN VOCATIONAL EDUCATION, AGRICULTURAL COMMUNICATIONS, AND LEADERSHIP. (3)
Supervised experiences in schools, businesses and agencies. Required of all Agricultural Education, Communications, Leadership and Home Economics Education majors. Includes observation, participation, experience, field trips, inspection of programs and professional organizations. May be repeated to a maximum of nine credits. Prereq: Junior standing. (Same as AGC/HEE/SOC 362.)

AED 501 PRACTICUM IN VOCATIONAL EDUCATION. (1-12)
Planned and supervised practicum in teaching, extension, governmental agencies, etc. Requires the integration of observation skills, development and use of objectives, using instructional strategies, developing effective interpersonal skills, using appropriate communication skills, developing a portfolio, selecting instructional materials, and evaluating instruction. Regularly scheduled seminars included as an integral part of course. May be repeated to a maximum of 12 credits. Prereq or concur: HEE/AED 586 or consent of instructor. (Same as HEE 501.)

AED 535 PRINCIPLES AND PHILOSOPHY OF VOCATIONAL EDUCATION. (3)
Study is made of philosophy, accepted principles, and legislation affecting programs in vocational education. (Same as HEE 535.)

AED 580 METHODS OF TEACHING VOCATIONAL EDUCATION I. (3)
Development of teacher competency in methods of teaching with emphasis on the problem-solving procedure and use of demonstrations, field trips, and audiovisual materials; evaluation of teaching-learning principles, studies of facilities and instructional materials needed in a vocational education program. Prereq: Permission of instructor. (Same as HEE 580.)

AED 586 METHODS IN TEACHING VOCATIONAL EDUCATION II. (3)
A study of teaching methods, curriculum development, basic skills integration, utilization of resources, working with special needs students, and professional responsibilities of the vocational education teacher. Prereq: Consent of instructor. (Same as HEE 586.)

AED 590 PROBLEMS IN VOCATIONAL EDUCATION. (3)
Problems in teaching vocational education for high school students and adults. May be repeated twice for a maximum of nine credits. Prereq: Permission of instructor. (Same as HEE 590.)

AED 670 ADVANCED METHODS IN TEACHING VOCATIONAL EDUCATION. (3)
The principles of method applied to teaching in the field of vocational education. Prereq: Experience in teaching vocational education. (Same as HEE 670.)

AED 671 YOUTH ORGANIZATIONS IN VOCATIONAL EDUCATION. (3)
A study of the underlying philosophy and principles for organizing and advising youth organizations in vocational education. Emphasis to be placed on activities which will enrich and motivate the instructional programs and which will develop leadership, cooperation and citizenship. (Same as HEE 671.)

AED 672 CURRICULUM CONSTRUCTION IN VOCATIONAL EDUCATION. (3)
A study of the principles of curriculum building with an emphasis on development of curriculum in home economics and agriculture education from middle school to adult levels. (Same as HEE 672.)

AED 678 SELECTING TEACHING MATERIALS. (3)
Selection and organization of specific references and other instructional materials to be used in teaching an area of vocational education. (Same as HEE 678.)

AED 679 ADULT EDUCATION IN VOCATIONAL EDUCATION. (3)
Preparation for teaching adult classes in vocational education including organization of classes, development of curriculum, and methods of teaching. (Same as HEE 679.)

AED 680 DIRECTING EXPERIENCE PROGRAMS IN VOCATIONAL EDUCATION. (3)
Directing experience programs including projects, activities, internships, and co-op education. Such areas as setting standards, planning, supervision, records, and evaluation will be discussed. (Same as HEE 680.)

AED 684 CURRENT TRENDS IN VOCATIONAL EDUCATION. (3)
Class work in current trends and significant developments in vocational education. May be repeated to a maximum of nine credits. (Same as HEE 684.)

AED 686 EVALUATION IN VOCATIONAL EDUCATION. (3)
A course to acquaint teachers of vocational education with techniques used in measuring attainment in vocational education in middle and high school, college, and adult education. Prereq: Teaching experience. (Same as HEE 686.)

AED 694 THE ADMINISTRATION OF VOCATIONAL EDUCATION. (3)
A course designed for superintendents, high school principals, and other administrators. Its purpose is to train for administering and supervising vocational education in schools. (Same as HEE 694.)

AED 695 SPECIAL PROBLEMS IN VOCATIONAL EDUCATION. (3)
An independent work course for students interested in vocational education. Students make individual investigations and report on special problems. (Same as HEE 695.)

AED 678 RESIDENCE CREDIT FOR THE MASTER’S DEGREE. (1-6)
May be repeated to a maximum of 12 hours. (Same as HEE 768.)

AED 779 SEMINAR IN VOCATIONAL EDUCATION. (1-3)
A critical study of selected problems in vocational education. The course is open only to students with experience in the field. May be repeated to a maximum of nine credits. (Same as HEE 779.)

AED 789 INDEPENDENT WORK IN VOCATIONAL EDUCATION. (1-3)
An independent work course for students who have completed a minimum of 12 semester hours of graduate work, one-half of which must have been in vocational education. May be repeated to a maximum of nine credits. (Same as HEE 789.)

AED 799 RESEARCH IN VOCATIONAL EDUCATION. (1-3)
Individual research of importance to vocational education. May be repeated to a maximum of nine credits. (Same as HEE 799.)
AEN Agricultural Engineering

AEN 102 INTRODUCTION TO BIOSYSTEMS ENGINEERING. (1)
An introduction to the engineering of food and fibers, production, and processing systems. Professionalism and the engineering approach to problem solving will be emphasized.

AEN 103 BASIC PRINCIPLES OF SURVEYING. (2)
General use of surveying equipment, development of topographic maps, layout of engineering systems, earthwork computations, and introduction to boundary surveys for Agriculture students. This course is not available for credit to persons who have received credit in another introductory surveying course. Lecture, one hour; laboratory, three hours. Prereq: A course in trigonometry, enrollment in the College of Agriculture and/or consent of instructor.

AEN 202 BIOSYSTEMS ENGINEERING PROBLEMS. (2)
An introduction to biosystems engineering; engineering problem solving; computer applications and structured programming; probability; statistics. Emphasis on application of these skills to biosystems applications. Lecture, two hours; laboratory, one hour per week. Prereq: MA 113 and sophomore standing; prereq or coreq: CS 221.

AEN 220 FARM TRACTORS AND ENGINES. (3)
Principles of selection and application of farm tractors and engines. Operating principles of internal combustion engines including carburetion, fuel injection, ignition, and lubrication. Power transmission application and efficiency are considered. Lecture, two hours per week; laboratory, two hours per week.

AEN 252 FARM SHOP. (3)
Wood and metal work, including blueprint reading, oxyacetylene and arc welding, power woodworking tools, soldering and pipe work. Lecture, one hour; laboratory, four hours. Prereq: Major in agricultural education or consent of instructor.

AEN 301 MICROELECTRONIC APPLICATIONS IN BIOSYSTEMS ENGINEERING. (2)
An introduction to the use of digital electronics and integrated circuits in solving agricultural engineering problems. Digital circuits, microprocessor concepts, computer interfacing, transducers, signal conditioning and control applications are discussed. Lecture, one hour; laboratory, two hours per week. Prereq: EE 307 or consent of instructor.

AEN 302 ANALYTICAL AND NUMERICAL METHODS FOR BIOSYSTEMS. (3)
An introduction to engineering problems encountered in agricultural and biological engineering systems. Introduction of psychrometrics; emphasis is on the solution of case studies using computer simulation and analysis, statistical methods and numerical techniques. Topics of current relevance used and case studies are analyzed. Prereq: ME 330 or CE 341 or consent of instructor. (Same as CE 460.)

AEN 303 ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS. (3)
Physical properties of agricultural materials and food products as related to engineering design for handling, storage, and processing. Prereq: EM 302, EM 303 and engineering standing.

AEN 340 PRINCIPLES OF FOOD ENGINEERING. (4)
The functional requirements and principles of operation of systems for the handling and processing of food and agricultural products. Lecture, three hours; laboratory, two hours per week. Prereq: Junior standing and completion of mathematics requirement in Food Science curriculum.

AEN 343 FLUID MECHANICS OF BIOSYSTEMS. (3)
Principles of fluid dynamics as applied to biosystems; Newtonian and non-Newtonian fluid flow processes; theory and application of pumps and low pressure fans; flow measuring devices and techniques. Prereq: ME 330 or CE 341 and engineering standing.

AEN 345 CROP DRYING AND PROCESSING. (3)
Principles of crop drying and storage; planning grain handling, storage, drying and processing facilities; materials handling and feed processing equipment; electrical considerations in farmstead planning; selection and application of electric motors and controls for the farmstead. Prereq: Junior standing or consent of instructor.

AEN 400 SENIOR SEMINAR IN AGRICULTURAL ENGINEERING. (1)
A course for senior students in agricultural engineering with emphasis on oral communications skills. Students will do literature searches on topics related to the agricultural engineering profession and present oral and written reports. Prereq: COM 199 and senior standing in agricultural engineering.

AEN 401 DESIGN IN AGRICULTURAL ENGINEERING. (4)
A course for senior students in agricultural engineering with emphasis on the engineering design process and effective oral communication. Creative involvement of students is required in solving open-ended problems where previously learned engineering principles culminate to produce actual designs which are appropriate to the profession of agricultural engineering. Lecture, two hours per week; laboratory, four hours per week. Prereq: Senior standing in agricultural engineering program and consent of instructor.

AEN 402 DYNAMICS OF BIOLOGICAL SYSTEMS. (3)
Energy capture and flow in biological systems; application of mathematical and simulation techniques to the analysis of biosystems. Topics include: study of the principle methods of energy capture in living organisms, population dynamics of living systems, energy flows in the biosphere, cellular chemical reactions, reaction kinetics, absorption and transfer processes, and growth dynamics. Topics are examined and modeled from an engineering standpoint. Prereq: ME 220 or equivalent or consent of instructor.

AEN 406G PHYSICS OF PLANT AND ANIMAL ENVIRONMENT. (3)
A study of the thermal, moisture, light and gaseous components of plant and animal environment with emphasis on interactions between these biological systems and their environment. Lecture, two hours; laboratory, two hours. Prereq: ME 325, engineering standing or consent of instructor.

AEN 407 ECONOMIC ANALYSIS OF BIOSYSTEMS. (2)
The financial and managerial aspects of biosystems in evaluating design alternatives to biosystems. Typical topics include are: concepts of present and future value, techniques of managerial economics, and biosystem design analysis in the evaluation of alternatives. Retirement/replacement policies and risk analysis. Prereq: Engineering standing.

AEN 417G DESIGN OF MACHINE SYSTEMS. (3)
A study of the operational characteristics and design features associated with production and processing equipment for food and fiber products and an introduction to conceptualization, analysis and design of these systems. Lecture, two hours; laboratory, two hours per week. Prereq: EM 313, ME 330, engineering standing or consent of instructor.

AEN 435G WASTE MANAGEMENT FOR BIOSYSTEMS. (3)
A study of the characteristics; treatment and utilization principles; and analysis and design of systems for managing waste from the production and processing of food and fiber. Lecture, two hours; laboratory, three hours per week. Prereq: MA 214 and BIO 108.

*AEN 438G FUNDAMENTALS OF GROUNDWATER HYDROLOGY. (3)
The first course in the physics of saturated flow in porous media. Topics include groundwater occurrence, Darcian flow, well hydraulics, flow nets and layered systems flow. The basic concepts of pollutant movement and unsaturated flow are introduced and case studies are analyzed. Prereq: ME 330 or CE 341 or consent of instructor. (Same as CE 460.)

AEN 450 SPECIAL PROBLEMS. (1-3)
An intensive study of some phases of agricultural engineering in which the student is particularly interested. Approval of the instructor is required. May be repeated to a maximum of six credits.

AEN 480G HEATING, VENTILATING AND AIR-CONDITIONING. (3)
An introductory course emphasizing the engineering systems aspects of thermal environmental design. Principles and applications of building energy requirements and thermal comfort criteria. Prereq: ME 325 and engineering standing or consent of instructor. (Same as ME 480G.)

AEN 505 ENGINEERING ANALYSIS. (3)
A study of the professional method of dealing with engineering problems and the application of this method to problems encountered in the agricultural industry. Lecture, two hours; laboratory, two hours. Prereq: Engineering standing or consent of instructor.

AEN 513 SOIL DYNAMICS IN TILLAGE AND TRACTION. (3)
A course for advanced undergraduate and graduate students which presents the principles of dynamic soil-machine interaction. The performance characteristics of tractive devices are presented along with the corresponding soil compliance. Soil response to mechanical disturbance or tillage is also presented. Lecture, two hours; laboratory, two hours per week. Prereq: EM 313, AEN 417G.
AEN 515 FLUID POWER SYSTEMS. (3)
Analysis and design of fluid power systems used in agricultural, industrial and processing equipment. Selected topics to include: positive displacement components, control devices, actuators, fluid transmission and system dynamics. Lecture, two hours; laboratory, two hours per week. Prereq: ME 330, ME 340 and engineering standing or consent of the instructor.

AEN 536 FLUVIAL HYDRAULICS. (3)
Rainfall physics, principles of erosion on upland areas and construction sites, stable channel design in alluvial material, mechanics of sediment transport, river mechanics, reservoir sedimentation. Prereq: CE 461G, ME 330 and engineering standing. (Same as CE 546.)

AEN 537 IRRIGATION AND DRAINAGE ENGINEERING. (3)
Planning and design of irrigation system; sprinkler, traveling gun, center pivot, trickle, subirrigation and residential and commercial irrigating; pumps; water quality treatment and supply; ponds and wells; principles of water movement and plant-soil relationships; surface and subsurface drainage. Prereq: ME 330 or CE 341 or consent of instructor.

AEN 545 ENGINEERING HYDRAULICS. (3)
Analysis of flow in enclosed conduits and natural and artificial open channels. Design of hydraulic structures. Prereq: CE 341, CE 441 and engineering standing. (Same as CE 549.)

AEN 549 FOOD AND BIOPROCESS ENGINEERING. (3)
An analysis of the most common unit operations utilized in the processing of food products. The principles of heat and mass transfer and reaction kinetics associated with processing operations will be used in defining process systems for drying, evaporation, refrigeration, freezing, fermentation, etc. Prereq: ME 325 or equivalent.

AEN 556 SOLID AND HAZARDOUS WASTE MANAGEMENT. (3)
Study of the generation and management of solid and hazardous wastes. Application of engineering principles to the collection, transport, processing, resource recovery and ultimate disposal of these wastes. Prereq: CE 471G, CE 521 or consent of instructor and engineering standing. (Same as CE 556.)

AEN 569 WATER RESOURCES SYSTEM DESIGN. (4)
Application of principles of hydrology, hydraulics, and environmental engineering in the planning, design, and analysis of a comprehensive water resource project. Emphasis on basic ideas and their application to the practical design of water supply, distribution, collection and treatment facilities. Written and oral presentation of student projects will be required. Lecture, three hours; laboratory, three hours per week. Prereq: CE 451, 461G, 549 and engineering standing. (Same as CE 569.)

AEN 599 TOPICS IN AGRICULTURAL ENGINEERING. (2-3)
A detailed investigation of a topic of current significance in agricultural engineering such as: design of small earth dams, vacuum dehumidification systems, small particle mechanics, environmental control in greenhouses, sprinkler irrigation, energy conversion in agriculture, bio-simulation. May be repeated to a maximum of six credits, but only three credits can be earned under the same title. A particular topic may be offered at most twice under the AEN 599 number. Prereq: Variable; given when topic identified.

AEN 618 ADVANCED PLANT, SOIL AND MACHINERY RELATIONSHIPS. (3)
A consideration of fundamental concepts of energy and materials in the identification and mensuration of parameters needed in the development of new machines for agriculture. Lecture, two hours; laboratory, two hours. Prereq: AEN 417G and 505.

AEN 638 GROUNDWATER HYDROLOGY. (3)
The equations of saturated and unsaturated groundwater flow, the formulation of boundary value problems, and some analytical methods of solution. Solutions using Fourier series, solutions involving the Fourier transform and the Fourier sine and cosine transforms. The Boltzman transformation, development of the Philip solution for horizontal and vertical flow. Mathematical statement of the saturated and unsaturated groundwater pollution problem and some analytical methods of solution. The semigroup solution of the resulting evolution equation, examples of solutions using the Laplace transform and the Fourier transform, more complex solutions in two-dimensional and three-dimensional domains, solutions for distributed sources in time and in space, solutions for time-varied boundary conditions. Prereq: MA 214, CE 461G or equivalent. (Same as CE 660.)

AEN 642 OPEN CHANNEL FLOW. (3)
The hydraulics of free surface flow including such topics as uniform flow, varied flow, unsteady flow, the hydraulic jump flow transitions, spillways and channel delivery. Prereq: CE 341. (Same as CE 642.)

AEN 648 ENERGY AND MASS TRANSFER IN AGRICULTURAL PROCESSING. (3)
A comprehensive and in-depth study of the principles of energy and mass transfer as they apply to the processing of agricultural and biological materials. Prereq: AEN 548 or consent of instructor.

AEN 653 WATER QUALITY IN SURFACE WATERS. (3)
Water quality requirements for various beneficial uses. Analysis of dispersion, advection, evaporation, natural aeration, biological oxidation and photosynthesis; their effects on the physical, chemical and biological quality of waters in streams, lakes, reservoirs, estuaries and other surface waters. Eutrophication. Prereq: MA 214 and CE 451, or consent of instructor. (Same as CE 653.)

AEN 658 INSTRUMENTATION FOR ENGINEERING RESEARCH. (3)
Instrumentation and measuring system characteristics; transducers for engineering measurements; and data acquisition and analysis. Lecture, two hours; laboratory, two hours per week. Prereq: Consent of instructor.

AEN 660 SIMILITUDE IN ENGINEERING. (3)
An advanced approach to engineering problems through the theory of similitude and its application to models. The use of geometrically similar, distorted and dissimilar models will be discussed. Prereq: Graduate standing.

AEN 665 WATER RESOURCES SYSTEMS. (3)
Application of systems analysis, mathematical modeling, and optimization in water resources management and design. Solution of engineering problems found in water supply, water quality, urban drainage, and river basin development and management by use of linear, nonlinear, and dynamic programming models. Prereq or concur: CE 421 and CE 569 or consent of instructor. (Same as CE 665.)

AEN 667 STORMWATER MODELING. (3)
Introduction to deterministic and parametric modeling approaches for mathematically simulating stormwater runoff and quality. Emphasis on modeling concepts and model formulation. Analysis of deterministic component models and their linkage. Formulation of existing parametric models. Presentation of methods for parameter optimization and regionalization. Demonstration of linkage between the two approaches with illustrative examples. Prereq: CE 341 and CE 461G, or consent of instructor. (Same as CE 667.)

AEN 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

AEN 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

*AEN 750 SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING. (1-3)
Independent work on selected research problems in one of the various fields of biosystems and agricultural engineering. Consultation and laboratory by appointment. May be repeated three times for a maximum of nine credits. Prereq: Approval of chairperson of department.

AEN 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

AEN 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

AEN 775 SEMINAR. (0)
Weekly meetings with members of the staff for reports and discussions on research and current trends and practices in agricultural engineering. May be repeated twice. One class hour.

AEN 795 THESIS. (0)
May be repeated twice.
AGC Agricultural Education, Communication, Leadership, and Home Economics Education

AGC 320 SURVEY OF AGRICULTURE AND CONSUMER MEDIA. (3)
An exploration of the social, political, and economic factors that influence how agricultural producers and consumers receive information through the media. In addition, the course will analyze how the general mass media cover agricultural and consumer topics. (Same as HES 320.)

AGC 362 PRACTICUM IN VOCATIONAL EDUCATION, AGRICULTURAL COMMUNICATIONS, AND LEADERSHIP. (3)
Supervised experiences in schools, businesses and agencies. Required of all Agricultural Education, Communications, Leadership and Home Economics Education majors. Includes observation, participation, experience, field trips, inspection of programs and professional organizations. May be repeated to a maximum of nine credits. Prereq: Junior standing. (Same as AED/HEE/SOC 362.)

AGC 395 SPECIAL PROBLEMS IN AGRICULTURAL COMMUNICATIONS. (1-3)
Directed independent study of a selected problem in the field of agricultural communications. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

AGC 399 EXPERIENTIAL LEARNING IN AGRICULTURAL COMMUNICATIONS. (1-3)
A field-based learning experience, under faculty supervision, in the application of communications techniques to agricultural issues. May be repeated to a maximum of three credits. Offered on a pass/fail basis only. Prereq: Consent of instructor and completion of learning contract.

AGC 400 AGRICULTURAL COMMUNICATIONS CAMPAIGNS. (3)
Exploration of communications campaigns and strategies in the agricultural sector. Students will learn how to plan and enact communications campaigns centered on agricultural issues and audiences.

AGC 450 TOPICS IN AGRICULTURAL COMMUNICATIONS (Subtitle required). (3)
Special topics or experimental courses in agricultural communications. Particular title may be offered twice at most under this course number. Students may not repeat under same title. May be repeated to a maximum of six credits. Prereq: Consent of instructor.

AGC 490 SEMINAR IN AGRICULTURAL COMMUNICATIONS. (3)
A capstone course for seniors in agricultural communications. Presentations, research papers, outside speakers, and career guidance will be significant course components. Prereq: AGC 320 and AGC 400 and senior standing; or consent of instructor.

AGR Agronomy

AGR 360 GENETICS. (3)
The basic principles of heredity as currently understood from evidence accumulated in classical, cytogenetic, molecular, and quantitative genetic experiments. Emphasis is placed on a thorough understanding of genetic principles and the relationship of genetics to all biological disciplines. Prereq: Six credits in biological sciences and one course in general chemistry. (Same as ASC/ENT 360.)

AGR 367 SOIL AND WATER ANALYSIS LABORATORY. (3)
Introductory laboratory emphasizing fundamental principles in soil science and water quality. Will provide hands-on experience in soil-water research and the written communication of acquired knowledge. Lecture 1.5 hours, laboratory three hours per week. Prereq: PLS 366 or approval of the instructor.

AGR 370 ENVIRONMENT, FOOD PRODUCTION AND SOCIETY IN THE U.S. (3)
Discussion of the present U.S. agricultural production system in perspective of past and present societal philosophies. Emphasis will be placed on basic biological and chemical principles related to primary production and how these principles may be or have been utilized for improvement of human existence. Included in the discussion will be issues of development of agriculture and civilization, environment and soils, and utilization of natural and produced resources.

AGR 395 SPECIAL PROBLEMS IN AGRONOMY. (1-4)
May be repeated for a maximum of nine credits. Prereq: Consent of appropriate instructor before registration.

AGR 399 EXPERIENTIAL LEARNING IN AGRONOMY. (1-6)
A field-based learning experience in agronomy under the supervision of a faculty member. May be repeated for a maximum of six credits.

AGR 404 INTEGRATED WEED MANAGEMENT. (4)
A study of weed management concepts based on the integration of weed biology and ecology data with cultural, biological, and herbicidal control. Lecture, three hours; laboratory, two hours. Prereq: PLS 366.

AGR 408 TOBACCO. (3)
History, botany, pathology, entomology, breeding, and culture of tobacco with special emphasis on burley. Prereq: PLS 366 or consent of instructor.

AGR 412 GRAIN CROPS. (3)
Study of the grain crops of the world with respect to adaptation, production, management and use. Prereq: PLS 366 or consent of instructor.

AGR 450G BIOGEOCHEMISTRY. (3)
A course emphasizing the physical, chemical, and biochemical make-up of soil/water systems and the information required to predict chemical fate in the environment. Emphasis is placed on the relationships describing mineral solubility, sorption and exchange reactions, redox reactions, volatility, and biochemical cycling. Prereq: CHE 105, 107, 115; two semesters of college biology. (Same as NRC 450G.)

AGR 460 INTRODUCTION TO MOLECULAR GENETICS. (2)
Molecular genetics is the study of the biochemical basis of heredity and focuses on the structure and expression of DNA at the molecular and cellular level. The course will provide a detailed understanding of the biochemical events involved in replication, prokaryotic and eukaryotic transcription, and translation of DNA, as well as RNA processing, recombination, and the theoretical underpinnings of genetic engineering. Prereq: AGR 360 or BIO 404G or consent of instructor. (Same as ENT 460.)

AGR 461 INTRODUCTION TO POPULATION GENETICS. (2)
This survey course examines the population dynamics and equilibria of genes in nuclei, chloroplasts and mitochondria. Emphasis will be on biological relevance (in plants, animals, and micro-organisms), but some theoretical derivations will also be introduced. Prereq: AGR 360 (or equivalent) and one course in probability/statistics. (Same as BIO/ENT/FOR 461.)

AGR 468G SOIL USE AND MANAGEMENT. (3)
The application of principles related to soils and their management in planning the utilization of land and associated resources. Lecture and discussion. Prereq: PLS 366 or consent of instructor.

AGR 470G FERTILIZERS AND SOIL FERTILITY. (3)
Sources and manufacture of fertilizer materials; soil reaction of elements essential for plant growth; effective use of fertilizers for various soil situations. Prereq: PLS 366 and PLS 386 or consent of instructor.

AGR 477G LAND TREATMENT OF WASTE (3)
Resource management with emphasis on principles and methods of soil application of wastes (agricultural, industrial, and municipal). Topics include chemical and biological systems; soil and plant management; development, monitoring, and record keeping. Prereq: PLS 366.

AGR 501 RECLAMATION OF DISTURBED LAND. (3)
Development of concepts, principles, and an understanding of the problems associated with restoring the productivity of soils disturbed by surface mining of coal as well as a limited discussion of reclamation of other types of disturbed soils. One all-day field trip is required. Prereq: PLS 366.

AGR 502 ECOLOGY OF ECONOMIC PLANTS. (3)
Study of the physical environment (radiation, temperature, precipitation, and evapotranspiration) in which crops are grown and the effect of the environment on crop growth and yield. Both micro- and macro-climatic relationships are considered.

AGR 510 FORAGE MANAGEMENT AND UTILIZATION. (4)
Critical study of grassland plants and the biological and physical factors operative in utilization of natural and cultivated grasslands by domestic animals. Lecture, three hours; laboratory, two hours. Prereq: PLS 366, or consent of instructor.

AGR 515 TURF MANAGEMENT. (3)
A study of the selection, culture, and management of certain turf species used for home lawns, golf courses, athletic fields, and highway slopes. Lecture, two hours; laboratory, two hours. Prereq: BIO 106 and PLS 366. (Same as HOB 515.)
AGR 556 SEED TECHNOLOGY. (3)
Changes occurring during reproductive development, seed germination and seed deterioration; principles of seed production for forage and grain crops; technical aspects of conditioning, testing, storage and marketing of genetically pure crop seed. Lecture, two hours; laboratory, four hours for 12 weeks. Prereq: PLS 386 or consent of instructor.

AGR 560 SOIL-PLANT RELATIONSHIPS. (3)
The soil-plant system with emphasis on the soil as an environment for plant roots; nutrient requirements of plants; and nutrient behavior in soils. Prereq: AGR 470G or equivalent, or consent of instructor.

AGR 564 FOREST SOILS. (3)
The physical, chemical and biological properties of soils as they relate to forest tree growth and the forest community. A study of the genesis, morphology, classification and utilization of soils for forestry. Three class hours per week with occasional extended field trips. Prereq: PLS 366 and AGR 367 and consent of instructor. (Same as FOR 564.)

AGR 566 SOIL MICROBIOLOGY. (3)
The nature and biochemical activities of soil microflora; their significance in soil genesis and structure and their role in soil fertility. Prereq: PLS 366 or an introductory microbiology course or consent of instructor.

AGR 567 METHODS IN SOIL MICROBIOLOGY. (1)
Methods in Soil Microbiology will be a laboratory course dedicated to introducing upper division students to the methods and techniques used by microbiologists and other soil scientists to examine organisms, interactions, and processes in soil systems. Laboratory, three hours per week. Prereq: PLS 366 or introductory microbiology course.

AGR 573 SOIL MORPHOLOGY AND CLASSIFICATION. (3)
Study of concepts of soil horizons, soil profiles and soilscape; morphological, physical, chemical and mineralogical parameters useful in their characterization. Soil forming factors and processes. Basic principles of soil classification. Characterization of selected Kentucky soils and their placement in the modern system; practical field problems in soil identification, characterization and classification. Lecture, two hours; laboratory, three hours per week. Prereq: PLS 366 and AGR 367 or consent of instructor.

AGR 575 SOIL PHYSICS. (2)
Physical properties of soils and their relationship to chemical, mineralogical, and biological soil properties and to plant growth. Prereq: PLS 366 and AGR 367 or consent of instructor.

AGR 576 LABORATORY IN SOIL PHYSICS. (1)
Laboratory experiences for the purpose of increasing an understanding of the principles of soil physical measurements and their relationships to chemical, mineralogical and biological soil properties. Laboratory, two hours. Prereq: AGR 575 or concurrent.

AGR 581 CHEMICAL ANALYSIS OF SOILS AND PLANTS. (4)
Laboratory emphasis on instrumental methods and techniques used in quantitative and qualitative chemical analysis of soil and plant materials and relation of these analyses to physical, chemical and biological systems. Lecture, one hour; discussion, one hour; laboratory, four hours. Prereq: PLS 366 or equivalent, or consent of instructor.

AGR 597 SPECIAL TOPICS IN PLANT AND SOIL SCIENCE (Subtitle required). (1-3)
Special topical or experimental courses in crop science, soil science or related areas of horticulture, or plant physiology for graduate and advanced undergraduate students. Special subtitle required and must be approved by the chair of Agronomy or Horticulture. A particular subtitle may be offered twice under AGR 597. Students may not repeat under the same subtitle. Prereq: Permission of instructor. (Same as HOR 597.)

AGR 599 SPECIAL PROBLEMS IN AGRONOMY. (1-4)
May be repeated for a maximum of nine credits. Prereq: Consent of instructor.

AGR 601 SPECIAL TOPICS IN MOLECULAR AND CELLULAR GENETICS. (1)
Each semester five distinguished scientists visit the UK campus to deliver a series of three formal lectures each and participate in numerous informal contacts with graduate students. The emphasis is on the presentation of the most current advances (often unpublished) in selected topics in molecular and cellular genetics. May be repeated to a maximum of six credits. (Same as BCH/BIO/MU/PPA 601.)

AGR 602 PRINCIPLES OF YIELD PHYSIOLOGY. (3)
Critical study of the physiological factors and processes involved in determining economic yield in grain crops. The focus will be on factors operating at the whole plant and plant community level as opposed to physiological processes at the cellular or subcellular level. A logical, analytical description of the process of economic yield production by grain crops will be developed and related to historical changes in crop yields and the potential for increasing yields in the future. Prereq: PLS 386 and BIO 430G or consent of instructor.

AGR 619 CYTOGENETICS. (4)
Classical, biochemical and molecular studies of the structure and function of eukaryotic chromosomes. Emphasis is placed on the effects of variation in chromosome type, structure and number on Mendelian genetics and in plant and animal breeding. Lecture, three hours; laboratory, two hours. Prereq: ASC/AGR 360 or BIO 404G. (Same as BIO 619.)

AGR 620 PLANT MOLECULAR BIOLOGY. (3)
This course is intended to be a treatment of current concepts of plant molecular biology. It will be a literature-based course, supplemented by handouts and reading lists. The course will deal as much as is possible with topics that are unique to plants. Current aspects of molecular biology that are relevant to the course content will be covered in the first part of the course; however, these lectures will not be a review of topics that should have been retained from introductory genetics and biochemistry courses. Also, they will not be a substitute for a molecular biology course. Prereq: One semester of undergraduate genetics and biochemistry or consent of instructor. (Same as BIO 620.)

AGR 622 PHYSIOLOGY OF PLANTS I. (3)
A physiological/biochemical treatment of central topics in modern plant physiology. Topics will include: plant-cell biology, ion transport, water and translocation, respiration and photosynthesis. Prereq: BIO 430G or equivalent or consent of coordinator. Prereq or concur: BCH 501. (Same as BIO/FOR/HOR 622.)

AGR 623 PHYSIOLOGY OF PLANTS II. (3)
A physiological/biochemical treatment of central topics in modern plant physiology. Topics will include: plant hormones, an introduction to plant biotechnology, senescence and abscission, stress physiology, phytochrome-photomorphogenesis-phototropism nitrogen and sulfur metabolism. Prereq: BIO 430G or equivalent, and BCH 501 or consent of course coordinator. (Same as BIO/FOR/HOR 623.)

AGR 630 EXPERIMENTAL TECHNIQUES IN PLANT PHYSIOLOGY. (3)
Presentation of theory and experimental application of methods for studying plant metabolism and cell biology. Techniques presented include: UV/Vis spectrophotometry, gel electrophoresis, TLC, GLC, HPLC, use of radioisotopes, gel filtration, isolation and characterization of organelles, mRNA isolation. Prereq: BIO 430G or equivalent or consent of instructor. (Same as BIO 630.)

AGR 650 SOIL-PLANT RELATIONSHIPS. (3)
An advanced course on the relationships between media and the root systems of plants growing therein. Prereq: AGR 366, BIO 430G (or equivalent), or consent of instructor. (Same as HOR 650.)

AGR 657 SEED BIOLOGY. (3)
Structure, development and function during plant reproductive development and seed ontogeny, including fertilization, embryogeny and endosperm development, seed formation, maturation, germination, dormancy and deterioration. Prereq: AGR 360, BIO 440G or consent of instructor. (Same as HOR 657.)

AGR 658 ADVANCED WEED SCIENCE. (4)
Taxonomical, ecological, physiological, chemical and biochemical aspects of cultural and chemical weed control, and herbicide toxicity and selectivity. Prereq: AGR 404 or equivalent, one plant physiology course, one biochemistry course or consent of instructor.

AGR 660 ADVANCED SOIL BIOLOGY. (2)
A critical evaluation of the current research status in selected aspects of soil biology. Prereq: AGR 566 or consent of instructor.

AGR 664 PLANT BREEDING I. (3)
The application of advanced genetic principles to plant improvement. An in-depth study of existing plant breeding procedures and their applications and consideration of new techniques that can be applied to plant breeding and crop improvement. Prereq: STA 570 or consent of instructor; ASC 562 recommended.

AGR 671 SOIL CHEMISTRY. (4)
A study of the chemical characteristics of the soil and of the more important chemical processes in the soil. Lecture and discussion, three hours; laboratory, two hours. Prereq: AGR 470G, 581; CHE 442G, or consent of instructor.

AGR 676 QUANTITATIVE INHERITANCE IN PLANT POPULATIONS. (3)
After a brief review of population genetics theory, the course is divided into two sections which cover methods of estimating genetic variances and selection methods in population improvement. The course will focus on handling and interpretation of actual data sets through data analysis and discussion of current literature. Prereq: STA 570, STA 671, STA 672, and ASC 662. (Same as STA 676.)
AGR 697 SPECIAL TOPICS IN AGRONOMY
(Subtitle required) (1-3)
Special topical or experimental courses in crop science, soil science or related areas of
agronomy for advanced graduate students. Special title required and must be approved
by the chairperson of the Department of Agronomy. A particular title may be offered twice
at most under AGR 697. Students may not repeat under the same title. May be repeated
to a maximum of six hours. Prereq: Will be set by instructor.

AGR 712 ADVANCED SOIL FERTILITY. (4)
An integration of the effects of soil, climate, species and management on the nutrition
and dry matter accumulation of plants. Lecture, three hours; laboratory, two hours per
week. Prereq: AGR 470G or AGR 560 or consent of instructor.

AGR 721 PEDOGENTIC PROCESSES. (4)
Soil forming factors and their interrelationships as related to development and
distribution of soils. Processes of rock and mineral weathering with associated soil
formation. Genesis and stability of soil clay minerals. Common methods used for
pedological investigations. Basic principles and concepts of the present soil classifica-
tion system and relationships between pedogenic processes and class criteria employed
by soil taxonomy. Lecture, three hours; laboratory, two hours per week. Prereq: AGR
573 or consent of instructor.

AGR 732 MINERAL NUTRITION OF PLANTS. (3)
Discussion of accumulation, translocation, and utilization of mineral elements by higher
plants. Emphasis will be placed on the relationships between these processes and plant
metabolism. Prereq: BIO 430G or equivalent; BCH 501 or consent of instructor. (Same
as BIO/HOR 732.)

AGR 741 CLAY MINERALOGY. (3)
A comprehensive study of the crystal structures of clay minerals commonly found in
soils and sediments. Lecture and discussion, three hours. Prereq: GLY 260 or consent
of instructor. (Same as GLY 741.)

AGR 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters.
Prereq: All course work toward the degree must be completed.

AGR 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six
semesters. Prereq: Registration for two full-time semesters of 769 residence credit
following the successful completion of qualifying exams.

AGR 768 RESIDENCE CREDIT
FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

AGR 769 RESIDENCE CREDIT
FOR THE DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

AGR 772 PLANT AND SOIL SCIENCE SEMINAR. (1)
Reports and discussion of problems and research in crops, soils, horticultural science
and plant physiology. May be repeated three times for a maximum of four credits. (Same
as HOR 772.)

AGR 773 SEMINAR IN PLANT PHYSIOLOGY. (1)
Reports and discussions on various topics in plant physiology. May be repeated for a
maximum of eight credits. (Same as BIO 773.)

AGR 798 RESEARCH IN AGRONOMY. (1-4)
May be repeated for a maximum of 12 credits. Prereq: Consent of instructor.

Botany Courses

(Bio 130) PLANT PHYSIOLOGY. (3)
See course description under Biology.

(Bio 161) CYTOGENETICS. (4)
See course description under Biology.
### 1996-1997 Course Descriptions – A

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#### ANA 513 DEVELOPMENTAL ANATOMY.
Human development is presented through lectures, visual aids, and occasional laboratory demonstrations in conjunction with laboratory exercises in ANA 511. The course deals entirely with intrauterine development, and includes some discussion of common abnormalities. Prereq: ANA 511, which may be taken concurrently, and enrollment in the College of Medicine or a graduate program in the biomedical sciences. In addition, students from graduate programs outside of anatomy must obtain the consent of the course director before registration.

#### ANA 516 ANATOMY OF THE NERVOUS SYSTEM.
The gross and microscopic structure of the central and peripheral nervous systems and their blood supply will be studied. The course will include the functional interpretation of anatomical structures and clinical correlations. Lecture, two hours; laboratory, two hours. Prereq: ANA 511, 512, 513; PGY 511; and enrollment in the College of Medicine or a graduate program in the biomedical sciences. In addition, students from graduate programs outside of anatomy must obtain the consent of the course director before registration.

#### ANA 529 CONCEPTS OF MORPHOLOGY.
The objective of this course is to present concepts of morphology as they concern cells, tissues, or organs, systems and/or regions of the human body. Necessarily, the history of the development of ideas about the selected topic will be surveyed. Inherent also in the presentation of concepts of structure will be the presentation of controversies which have resulted from differing methods and interpretations. Lecture, four hours. Course material will be presented in lectures, seminars, laboratory, through selected readings or a combination of these instructional methods. May be repeated to a maximum of four hours. Prereq: Advanced work in biological sciences and consent of the instructor.

#### ANA 530 COMBINED HISTOLOGY AND SPECIAL ORAL MICROANATOMY.
An analysis of the histological structure and organization of the human body, including the especially detailed treatment of the tissues and organs related to the oral cavity. Prereq: Admission to the College of Dentistry or some background in biology and consent of instructor.

#### ANA 534 ANATOMY OF THE HUMAN HEAD AND NECK.
The detailed regional anatomy of the human head and neck is studied by various techniques, the most important of which is dissection. Emphasis is placed on the anatomical relationships with each region. Lecture, two hours; laboratory, six hours. Prereq: Admission to the College of Dentistry.

#### ANA 536 HUMAN EMBRYOLOGY, AN ABBREVIATED COURSE.
A concise presentation of developmental mechanisms, early development of the embryo, and subsequent development of selected systems and regions of the body. Lecture, one hour. Prereq: Admission to the College of Dentistry.

#### ANA 584 ANATOMY OF THE HUMAN HEAD AND NECK.
A concise presentation of the functional organization of the human nervous system. Lecture, two hours. Prereq: Admission to the College of Dentistry.

#### ANA 600 SEMINAR IN ANATOMY.
A weekly seminar devoted to presentation and discussion of classic and new research in the field. May be repeated to a maximum of four credits. Prereq: Admission to the anatomy graduate program or permission of the course director.

#### ANA 605 PRINCIPLES OF NEUROBIOLOGY.
The objective of this course is to provide graduate students of diverse backgrounds with an introduction and overview of current problems and controversies in neurobiology and clinical neurology. The course will cover a variety of illnesses including epilepsy, neurodegenerative diseases, stroke, psychiatric illness, pain, diseases of immune origin, motor dysfunction and inherited disorders. Prereq: ANA/BCH/NEU/PGY/PHA 605 or consent of instructor. (Same as NEU/PHA 606.)

#### ANA 612 BIOLOGY OF AGING.
A multidisciplinary discussion of how the process of aging affects biological systems. Coverage will be quite broad and includes topics such as subcellular and cellular aging, genetics, immunology, anatomy and physiology, animal model of aging, etc. Prereq: Enrollment in a graduate program of a biomedical science department or consent of instructor. (Same as BIO/GRN 612.)

#### ANA 618 MOLECULAR NEUROBIOLOGY.
This course provides knowledge base and analytical skills in the field of molecular neurobiology. An in-depth introduction to current technologies, their rationale and limitations, will be the focus to address normal brain function and neuropathological conditions. Prereq: BCH 501, 502, NEU 605, or consent of instructor. (Same as BIO/MI/PGY 618.)

#### ANA 629 TECHNIQUES OF ANATOMICAL RESEARCH.
The objective of this course is the familiarization of students with research techniques in anatomy. The relationship will be tutorial. Students will work under the direction of given staff members for determined periods of time, usually on a problem. The exact length of time will depend upon the student’s purposes, progress and the techniques. The problem may be a new research or a repetition of previous work. May be repeated to a maximum of four hours. Prereq: Previous senior college or graduate level work in biology and consent of instructor.

#### ANA 631 ADVANCED HUMAN ANATOMY.
The objective of this course is to meet individual student needs for increased knowledge in particular areas of gross human morphology. Investigations of problems involving gross morphology will be carried out. One or several defined areas of the body will be studied in considerable detail by dissection, by intensive use of the pertinent literature, by the use of visual aids, dissected materials and other appropriate learning aids. Prereq: A background in gross human anatomy equivalent to a medical school course in regional anatomy and consent of course director and/or Director of Graduate Studies in Anatomy and Neurobiology.

#### ANA 633 ADVANCED DEVELOPMENTAL ANATOMY.
This is a detailed study of intra-uterine development, both normal and abnormal, usually arranged as a tutorial or small seminar series. Enrollment limited to 10 students. Prereq: ANA 511 or 811 and ANA 513 or their equivalents; or consent of instructor.

#### ANA 636 ADVANCED NEUROANATOMY.
The objectives include specific and detailed correlation of microscopic and ultrastructural morphology of structures in the nervous system with function of these structures. Emphasis will be placed on function and structure-function relationships, neurotransmitters, chemically identified constituent of the nervous system, neuronal as well as non-neuronal cells, plasmas of the nervous system and developmental biology. The detailed content and emphasis will depend on both the background and goals of the students. Depending on number of credits a student registers for, and the topic and course orientation, laboratory work, library work, written and/or oral presentations may be a course requirement. Prereq: ANA 511, 512, 513, 516, or equivalents, or consent of instructor.

#### ANA 638 DEVELOPMENTAL NEUROBIOLOGY.
An explanation of the processes which contribute to the development of the nervous system. Neurophysiological, cell biological and molecular approaches to cell differentiation, neuronal pathfinding and synapse formation and stabilization will be explored and discussed. Examples will be drawn from both vertebrate and invertebrate preparations. Prereq: BIO 535 or consent of instructor. (Same as BIO/PGY/PSY 638.)

#### ANA 662 ULTRASTRUCTURAL ANATOMY.
The objectives of this course are to advance the students’ knowledge of the submicroscopic structure of cells and tissues. Correlation of intra- and extracellular morphology and function will be emphasized. Students will do detailed laboratory work in the techniques of electron microscopy. Depending on the number of credits a student registers for, and the topic and course orientation, laboratory work, library work, written and/or oral presentations may be a course requirement. Prereq: ANA 512, previous work in microscopy including histology or cytology, or equivalents, and consent of instructor.

#### ANA 748 MASTER’S THESIS RESEARCH.
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.
Approved electives:

ANA 850 APPLIED HUMAN ANATOMY
ANA 851 RESEARCH IN ANATOMY

ANS Anesthesiology

ANS 815 FIRST-YEAR ELECTIVE, ANESTHESIOLOGY. (1-3)
With the advice and approval of his or her faculty adviser, the first-year student may choose approved electives offered by the Department of Anesthesiology. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the first-year curriculum. Pass-fail only. Prereq: Admission to first year, College of Medicine.

ANS 825 SECOND-YEAR ELECTIVE, ANESTHESIOLOGY. (1-4)
With the advice and approval of his or her faculty adviser, the second-year student may choose approved electives offered by the Department of Anesthesiology. The intent is to provide the student an opportunity for exploration and study in an area which supplements and/or complements required course work in the second-year curriculum. Pass-fail only. Prereq: Admission to second-year medical curriculum and approval of adviser.

†ANS 835 THIRD-YEAR ELECTIVE, ANESTHESIOLOGY.

ANS 850-899 FOURTH-YEAR ELECTIVE FOR MEDICAL STUDENTS. (1-6)
With the advice and approval of the faculty adviser and the Student Progress and Promotions Committee, the fourth-year student may choose approved electives offered by the various departments in the College of Medicine. The intent is to provide the student an opportunity to develop his fund of knowledge and clinical competence. Prereq: Admission to the fourth year, College of Medicine and/or permission of the Student Progress and Promotions Committee.

ANT Anthropology

ANT 120 INTRODUCTION TO PHYSICAL ANTHROPOLOGY. (3)
Introduction to physical anthropology. Includes topics on human evolution, human “racial” (population) variation, primate behavior, and human genetics. The role of culture in affecting human evolution and human biology is considered.

ANT 121 INTRODUCTION TO CULTURAL ANTHROPOLOGY. (3)
The study of variations in beliefs, behaviors and institutions of different peoples. Acquaints the student with a knowledge of how anthropological concepts and knowledge are used to understand and appreciate cultural diversity.

ANT 130 INTRODUCTION TO COMPARATIVE RELIGION. (3)
Comparative study of major world and selected regional religions with emphasis on analysis of belief, ritual, artistic expression and social organization. Eastern and Western religions are considered. (Same as RS 130.)

ANT 160 TRIBAL PEOPLES IN THE MODERN WORLD. (3)
An introduction to the society, culture, and beliefs of preliterate and tribal peoples, emphasizing both traditional culture patterns and adaptations to the modern world. The course will feature extended description of a single tribal people among whom the instructor has lived and worked.

ANT 161 THE WORLD OF PEASANTS. (3)
An introduction to the society, culture, and beliefs of peasant farmers and pastoralists, emphasizing both traditional cultural patterns and adaptations to the modern world. The course will feature extended description of a single peasant people among whom the instructor has lived and worked.

ANT 215 INTRODUCTION TO ANTHROPOLOGICAL LINGUISTICS. (3)
Introduction to the nature of language structure and function. Special emphasis on the relationship of language to other cultural systems. Credit will not be given to students who already have credit for either ENG/LIN 211, ENG 414G.

ANT 221 NATIVE PEOPLE OF NORTH AMERICA. (3)
A survey of the aboriginal Indian cultures of North America, and of the impact of four centuries of British, French, Spanish, and Russian contact on the Indian communities. The course will include consideration of the status of Indians in present-day North America.
ANT 232 MODERN HUMAN VARIATION. (3)
A survey of the principal aspects of human variation within and between populations. Attention is focused upon the concepts of race, racial mixture, human ecology, and human biology.

ANT 235 FOOD AND CULTURE. (3)
Examines the way values and behaviors related to food production and consumption are shaped by the physical and cultural environment. Data are drawn from non-Western and Western cultures. Implications of cultural factors for contemporary issues in nutrition are discussed.

ANT 240 INTRODUCTION TO ARCHAEOLOGY. (3)
Introduces the theories, techniques, and strategies used by archaeologists to recover and interpret information about past cultures.

ANT 241 ORIGINS OF OLD WORLD CIVILIZATION. (3)
A survey of cultural developments in the Old World from the earliest times to the beginning stages of civilization.

ANT 242 ORIGINS OF NEW WORLD CIVILIZATION. (3)
Survey of the origin and growth of prehistoric American Indian cultures as revealed by archaeological data. Prereq: ANT 120, 121.

ANT 255 HUMAN SEXUALITY IN CROSS-CULTURAL PERSPECTIVE. (3)
The study of human sexuality in evolutionary and cross-cultural perspective; considers gender identity, sexual response, cultural rules and norms concerning sexual behavior and the social organization of sexual behavior. Prereq: ANT 120 or ANT 121 or PSY 100 or SOC 101.

ANT 312 COMPARATIVE CIVILIZATIONS. (3)
Comparison of a number of the high civilizations of the ancient, medieval, and modern worlds, including both Old World and New World civilizations. The course will stress both similarities and differences in their historical development and cultural achievements.

ANT 320 ANDEAN CIVILIZATION. (3)
A study of the Inca and other pre-Hispanic civilizations of highland South America in terms of their origins, their development, and their material, social, and intellectual achievements.

ANT 322 AZTEC AND MAYA CIVILIZATION. (3)
The course provides a study of the Aztec, Maya and related cultures of the New World. It provides a detailed discussion of pre-Columbian subsistence practices, economy, religion and politics by tracing the development of Mesoamerican civilization from its earliest beginnings to the Spanish conquest.

ANT 323 PEOPLES OF THE PACIFIC ISLANDS. (3)
A consideration of the various cultures of the Pacific Islands. Attention will be given to both traditional cultural features and the responses of contemporary Pacific societies to economic, political, and social influences from industrialized countries. Prereq: ANT 121.

ANT 325 PEOPLES OF INNER ASIA. (3)
A study of the pastoral nomadic societies and the oasis communities of central Russia, China, and Tibet, emphasizing their traditional culture patterns, their role in history, and their adaptation to the modern conditions of Russian and Chinese rule.

ANT 326 PEOPLES OF EAST ASIA. (3)
A survey of the societies and cultures of China, Japan, and Korea as revealed through anthropological studies of peasant communities, urban elites, and tribal minorities.

ANT 327 CIVILIZATION AND CULTURE OF INDIA. (3)
Considers the content and interrelationships between India’s religious and philosophical tradition and the structure and organization of rural village life in historic, demographic and geographic context.

ANT 332 HUMAN EVOLUTION. (3)
Basic concepts and theory of evolution will be reviewed and applied to the study of fossil man. The evidence for the evolution of man and his primate relatives will be studied, with attention paid to alternate interpretations of the data. Prereq: ANT 120 or BIO 150.

ANT 338 PEOPLES OF THE NEAR EAST. (3)
A survey of past and present cultural adaptations in the Near East and North Africa, stressing the interplay of different ethnic and religious groups and the relationships between nomads, peasant farmers, and town dwellers.
ANT 519 HISTORICAL LINGUISTICS. (3)
Language change; reconstruction of linguistic systems, language classification; comparative linguistics; temporal, spatial, and social context of language change. Prereq: ANT 215, ENG/LIN 211, or ENG 414G; or equivalent. (Same as LIN 519.)

ANT 523 HUMAN VARIATION IN EVOLUTIONARY PERSPECTIVES. (3)
Examines biological diversity within and between human populations today from the perspective of evolutionary theory and human ecology. Topics covered will include growth and development, diet and nutrition, demography, ecology of disease.

ANT 525 APPLIED ANTHROPOLOGY. (3)
Principles of policy research and intervention in cultural anthropology with attention to the theoretical and ethical basis of such research and intervention. Intervention techniques considered include research and development anthropology, action anthropology, community development, community advocacy anthropology and culture brokerage. Prereq: Nine hours of cultural anthropology or consent of instructor.

ANT 526 PSYCHOLOGICAL ANTHROPOLOGY. (3)
Explores the interrelations of culture, social structure, and individual psychology. The historical development of theory treating the relationships between culture and personality, as well as recent theory are emphasized. Prereq: Nine hours of cultural anthropology and PSY 100, or consent of instructor.

ANT 527 CHILDREN AND FAMILY IN APPALACHIA. (3)
Exploration of family life and the socialization of children in the Appalachian Southern Highlands from both an historical and a contemporary comparative perspective. Prereq: Six hours of social sciences or consent of the instructor. (Same as FAM 550.)

ANT 529 SURVEY OF MEDICAL ANTHROPOLOGY. (3)
A cross-cultural survey of health, disease, and healing in folk, primitive, and modern pluralistic societies. Biocultural and ethnomedical approaches in medical anthropology. Prereq: Nine hours of anthropology or consent of instructor. (Same as BSC 529.)

ANT 532 POLITICAL ANTHROPOLOGY. (3)
The course examines political systems, process, and action in formal and informal arenas. Emphasis is put on cross-cultural variation, and evolutionary processes in political systems in contemporary as well as historical perspectives. Prereq: Nine hours of cultural anthropology or consent of instructor.

ANT 533 SOCIAL ORGANIZATION. (3)
Comparative perspectives in social organization in non-western societies. The course examines systems of kinship, marriage, family, community, community organizations and voluntary associations in the ethnographic record as well as theoretical approaches to structure and change. Prereq: Nine hours of cultural anthropology or sociology or consent of instructor. (Same as SOC 533.)

ANT 534 THE SOUTHERN APPALACHIANS: A SOCIOLOGICAL INTERPRETATION. (3)
A sociological interpretation of the Southern Appalachians, emphasizing the great diversity—social, cultural, economic—in the various parts of this area by study of the major institutions, value orientations, and social and cultural changes affecting both the whole area and its sections. Prereq: Six hours of social science or consent of instructor. (Same as SOC 534.)

ANT 535 PHONETICAL ANALYSIS. (3)
An investigation of speech-sounds and systems of speech-sounds. Articulatory phonetics, analysis of phonological systems, phonological theories. Includes fieldwork on the phonology of a non-Indo-European language; within a given academic year, the same language serves as the basis for fieldwork in ANT/ENG/LIN 515 and ANT/ENG/LIN 516. Prereq: ENG/LIN 211 or equivalent. (Same as ENG/LIN 515.)

ANT 543 CULTURAL RESOURCE MANAGEMENT. (3)
Introduction to the theory and practice of cultural resource management as it has developed in the historic preservation movement in the United States. The history of preservation is covered along with the development of the contemporary legal tools. The implications of these for the field evaluation of sites is presented.

ANT 545 INTRODUCTION TO HISTORICAL ARCHAEOLOGY. (3)
Historical archaeology applies archaeological methods and techniques to the remains of societies having written histories. The course introduces students to the history and theoretical development of the discipline, and to the variety of the data sources used by historical archaeologists. Particular attention is given to the ways in which historical archaeologists use material culture to address research issues of interest in anthropology, history, and other relevant disciplines.

ANT 550 SYMBOLS AND CULTURE. (3)
Examines the way in which symbolic systems create the meanings through which we experience life. The course will explore symbols and symboling behavior from a humanistic perspective, and will present examples of non-Western symbolic systems. Prereq: ANT 121 or consent of instructor.

ANT 551 BIOARCHAEOLOGY. (3)
Human osteology (the study of the human skeleton system) within the context of anthropological archaeology. Identification of the bones of the human skeleton with additional information on growth and development, morphological variations, and skeletal responses to biophysical stress (malnutrition, disease, and physical activity patterns). The analysis of human remains from archaeological contexts will be covered in detail.

ANT 552 PREHISTORIC FOODWAYS. (3)
This seminar focuses on methodological and theoretical approaches to the study of subsistence practices in prehistoric and historic societies, through analysis of the archaeological record. Students will be introduced to materials and methods in bioarchaeology, archeobotany, zooarchaeology, and to the ethnographic literature on foodways.

ANT 555 EASTERN NORTH AMERICAN ARCHAEOLOGY. (3)
Detailed analysis of prehistoric cultures of eastern United States with emphasis on interpretation of prehistory in Ohio River Valley. Prereq: ANT 120, 121, and 442G or consent of instructor. Prereq: ANT 240 and six hours of archaeology or cultural anthropology, or consent of instructor.

ANT 580 TOPICS IN ANTHROPOLOGY. (3)
Selected topics of theoretical or methodological importance in anthropology, with special attention to topics of contemporary relevance. Refer to Schedule of Classes for topics. May be repeated to a maximum of six credits.

ANT 581 INDEPENDENT WORK IN ANTHROPOLOGY. (1-4)
May be repeated three times to a maximum of 12 credits. Prereq: Major and a standing of 3.0 in the department.

ANT 582 SENIOR INTEGRATIVE SEMINAR. (3)
Seminar focusing on current issues in anthropology. Purpose is to provide a forum in which advanced undergraduates can integrate knowledge acquired in previous anthropological coursework and evaluate the contributions of the different anthropological subdisciplines to understanding contemporary problems. Emphasis placed on oral and written communication. Prereq: Major in anthropology; senior standing.
ANT 585 FIELD LABORATORY IN ARCHAEOLOGICAL RESEARCH. (3-6)
Practical supervised training in field in archaeological research methods and techniques, problem analysis, field laboratory procedures, recording methods. Laboratory, 20 to 40 hours per week. May be repeated to a maximum of 12 credits. Prereq: Consent of instructor.

ANT 600 PRACTICUM IN TEACHING ANTHROPOLOGY. (1)
Guided practical experience in teaching, supplemented with group discussions of teaching practice and selected readings on lecture technique, course development, test writing and other skills for participation in the professoriate. May be repeated to a maximum of three credits. Prereq: Graduate status in anthropology or consent of instructor.

ANT 601 INTRODUCTORY SEMINAR IN ETHNOGRAPHY. (3)
A critical examination of key writings in ethnography, focusing on issues of data gathering, analysis and interpretation of results, and disciplinary significance. This seminar is a requirement for the advanced degree in anthropology. Prereq: Admission to the anthropology graduate program; ANT 510 and ANT 533 or equivalents; consent of instructor.

ANT 602 INTRODUCTORY SEMINAR IN CULTURE DYNAMICS. (3)
An in-depth discussion of the theory and method of the various approaches to the study of long-term culture change in past and present societies. This course stresses interdisciplinary problem-oriented research on a specific theme of culture change. Emphasis also is placed on the development of writing skills, oral presentations, professional standards or performance in research and communication, and critical thinking. Prereq: Admission to the Anthropology graduate program and ANT 601; consent of instructor.

ANT 620 TOPICS AND METHODS OF EVALUATION. (3)
An examination of a subset of evaluation methods, topics, and problems. An introductory course in the area with minimal emphasis on quantitative methods. The course is designed to: provide a perspective from which evaluation studies may be viewed; and, to provide experiences for those who will learn from or conduct evaluations. Prereq: Consent of instructor, and a basic course in statistics or research. (Same as EDP/EPE 620/SOC 622.)

ANT 621 ADVANCED TOPICS AND METHODS OF EVALUATION. (3)
An advanced course in evaluation methods and techniques with an emphasis on quantitative methodology. State of the art ideas and methods of conducting evaluation studies and analyzing data from those studies are presented. The course is designed primarily for those who are conducting or will conduct evaluation studies. Prereq: A basic course in statistics or its equivalent; EDP/EPE 620/SOC 622; and consent of instructor. (Same as EDP/EPE 621.)

ANT 637 SOCIOCULTURAL DIMENSIONS OF ECONOMIC DEVELOPMENT. (3)
Examination of social, cultural and economic conditions in lesser developed countries. Discussion of the various socioeconomic and cultural theories of change and developments, and of alternative policies for the world of the future. Considers the possible roles for social scientists in policy formulation and application. Prereq: Six graduate credits in social sciences or consent of instructor. (Same as SOC 637.)

ANT 638 FOOD SYSTEMS AND AGRARIAN CHANGE. (3)
An examination of the way in which the organization of food procurement, distribution, and consumption in developing countries has affected and been affected by agrarian change. Prereq: Consent of instructor. (Same as SOC 638.)

ANT 640 SCIENCE, AGRICULTURE, AND DEVELOPMENT. (3)
An in-depth examination of the interrelations between science, agriculture, and development. Both domestic and international issues are explored. Prereq: Graduate standing in the social or agricultural sciences. (Same as SOC 640.)

ANT 641 GENDER ISSUES IN DEVELOPMENT. (3)
An examination of gender issues in domestic and international development. Prereq: Graduate standing in the social or agricultural sciences or permission of the instructor. (Same as SOC 641.)

ANT 650 THEORY IN ARCHAEOLOGY. (3)
This seminar examines the development of archaeological theory with specific emphasis on the discipline of anthropological archaeology in the New World. Particular schools and trends in contemporary archaeological theory are discussed in detail. Prereq: ANT 541 or consent of instructor.

ANT 651 ARCHAEOLOGICAL DATA ANALYSIS. (3)
This course examines the manipulations of archaeological data that follow fieldwork. These procedures, usually consisting of data processing and classification, are often undertaken in the field and as data are being gathered. Data organization and analysis are the basic goals of this course. May be repeated to a maximum of six credits. Prereq: ANT 541 or consent of instructor.

ANT 652 DEMOGRAPHIC ARCHAEOLOGY. (3)
A seminar which examines the theory and methodology used by archaeologists to study population aggregates ranging from individual households to regional populations. Particular emphasis given to theoretical perspectives which integrate ecological, social and spatial analyses of population data. Prereq: ANT 541 or consent of instructor.

ANT 653 PREHISTORIC ECONOMICS. (3)
This seminar examines the theory and methodology used by archaeologists to study and reconstruct the economic structure of past societies. Discussion examines forms of subsistence and craft production and systems of resource distribution and exchange. Prereq: ANT 541 or consent of instructor.

ANT 654 ARCHAEOLOGY OF POLITICAL SYSTEMS. (3)
This course is designed to study the archaeology of political systems. The goals are to discuss the major trends, concepts, and perspectives in researching event and process in the evolution of political organization and social integration. A corollary goal is to examine the empirical evidence for, and archaeological correlates of, political evolution. It is not intended as a comprehensive coverage of all theories about past political systems, or as a survey of the rise and development of political forms in complex societies around the world. Prereq: ANT 541, ANT 602 or consent of instructor.

ANT 660 ETHNOGRAPHIC RESEARCH METHODS. (3)
Cultural anthropological research techniques including key informant and ethnographic interviewing, participant observation, field note preparation and coding, survey methodology, photography, mapping, rapid assessment procedures and other specialized techniques are discussed and practiced. Ethical responsibilities of anthropologists reviewed. Prereq: Major or graduate standing in a social science, or consent of instructor.

ANT 661 ETHNOGRAPHIC DATA ANALYSIS. (3)
A practical, learning-by-doing approach to the analysis of qualitative and quantitative ethnographic data. Students will work with ethnographic field notes, life histories, ethnographic survey data, and other results of field research. Prereq: ANT 660 and a statistics course.

ANT 662 RESEARCH DESIGN. (3)
Seminar discussion and guided individual student research covering the relationship between theory, methods, and reality; how to better design anthropoligical inquiry. Prereq: One year of graduate work in a behavioral science field and consent of instructor.

ANT 664 CULTURAL ISSUES IN MENTAL ILLNESS. (3)
An in-depth discussion of theory and method of the various approaches to cultural and social factors in the etiology, distribution, and treatment of mental illness. Data from non-Western and Western cultures are examined. Prereq: Enrollment in graduate program in anthropology, sociology, psychology, educational and counseling psychology, or consent of instructor. (Same as BSC/PSY 664.)

ANT 684 FARMING SYSTEMS RESEARCH METHODS. (3)
A critical analysis of the concepts, methods, and practices of farming systems research. Design and carry out an FSR project. Prereq: Graduate standing in the social or agricultural sciences. (Same as SOC 684.)

ANT 691 CULTURAL RESOURCE MANAGEMENT CLERKSHIP. (1-3)
Practical experience in aspects of cultural resource management process are provided through a one-semester rotation of work in the Office of State Archaeology (OSA), Museum of Anthropology (UKMA), and the program for Cultural Resource Assessment (PCRA). Students are assigned tasks at each work assignment rotation during the semester and are evaluated on the basis of work performance and a journal summary of this experience by a committee of their supervisors. Prereq: Graduate standing in anthropology or consent of instructor.

ANT 720 SEMINAR IN CULTURAL ANTHROPOLOGY. (3)
Intensive examination of selected topics of theoretical and/or methodological interest in cultural anthropology. Possible topics include religion, kinship, marriage, political systems, law, economic systems, modernization, urbanization, cross-cultural methodology, and others. May be repeated to a maximum of six credits. Prereq: Consent of instructor.
ANT 725 SEMINAR IN APPLIED ANTHROPOLOGY. (3)
Seminar discussion and individual or group research in the applications of social anthropology to the solution of institutional, community, regional or national problems. Attention will be given to ethics, to the role attributes of the applied anthropologist, and to the history of applied anthropology. Prereq: ANT 525 or consent of instructor.

ANT 731 ADVANCED SEMINAR IN SOCIAL AND POLITICAL DYNAMICS. (3)
Theoretical frameworks for the analysis of political systems and processes. The seminar explores politics as action and systemic process in contemporary, prehistoric, and historical contexts. Students are expected to formulate research questions and discuss current theory in a critical fashion. Prereq: ANT 601 and 602 or consent of instructor.

ANT 732 ADVANCED SEMINAR IN ECOLOGICAL ANTHROPOLOGY. (3)
A study of interrelationships among populations, organization, environment, technology and symbols. The course focuses on recent anthropological contributions to the understanding of ecological relationships both now and in the past, including how people exploit the environment and how resource exploitation results in environmental change. Prereq: Completion of ANT 601 and ANT 602 or consent of instructor.

ANT 733 ADVANCED SEMINAR IN SYMBOLS AND MEANING. (3)
Advanced seminar in the development of anthropological approaches to cultural meaning in actions, thought, and language from the 1960s. Includes the social structural approach to symbolism and ritual, cognitive approaches to meaning, the anthropology of experience and expression, interpretive and post-modern approaches, and topical applications of these approaches. Prereq: ANT 601 and 602 or consent of instructor.

ANT 734 ADVANCED SEMINAR IN ECONOMIC ANTHROPOLOGY. (3)
Theoretical frameworks for the analysis of economic systems and processes. The seminar explores the interaction between economic phenomena and other aspects of social and political organization both as action, structure, and systemic process in contemporary, prehistoric, and historical contexts. Students are expected to formulate research questions and discuss current theory in a critical fashion. Prereq: ANT 601 and 602 (ANT 538 is recommended) or consent of instructor.

ANT 735 ADVANCED SEMINAR IN PRACTICE AND ACTION. (3)
Comparative analysis of various modes of social action including action research, advocacy, cultural action, and participatory action research. Foundations in social theory considered. Prereq: Admission to graduate program in anthropology or consent of instructor.

ANT 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

ANT 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

ANT 750 GRADUATE FIELD STUDY IN ANTHROPOLOGY. (1-6)
Field research as part of a long-range anthropological research project for graduate interns training under direct faculty supervision. Provides student with experience conducting scientific research as research team member. Report required. Laboratory, three hours to full time. Prereq: Appropriate language proficiency; preparatory area study plus consent of instructor.

ANT 765 ADVANCED SEMINAR IN MEDICAL ANTHROPOLOGY. (3)
(1) Advanced history and theory of medical anthropology; (2) research design, field work, analysis of data in medical anthropology. Prereq: ANT 529 or equivalent, or consent of instructor. (Same as BSC 765.)

ANT 767 PRACTICUM IN APPLIED ANTHROPOLOGY. (1-6)
Practical field experience in which the student applies the theory and method of social anthropology to the solution of a problem defined by the student in consultation with a community or a public or private service agency. Required of all doctoral students in Applied Anthropology. Prereq: Consent of instructor.

ANT 768 RESIDENCE CREDIT FOR MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

ANT 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

ANT 770 TOPICAL SEMINAR: (Subtitle Required). (3)
Intensive work in particular fields of anthropology. May be repeated four times. Prereq: Graduate standing.

ANT 774 BEHAVIORAL AND ECOLOGICAL ASPECTS OF HUMAN NUTRITION. (3)
This course will examine the social ecology of human nutrition using the evolutionary perspective. It will apply the concepts and principles of social science to the study of human nutrition. The course serves also as an introduction to nutritional anthropology. Discussions will focus on the origins of the human diet; human dietary adaptation to diverse ecological and technological situations; social, cultural, behavioral and ecological factors that influence dietary choices in primitive, peasant, modernizing and contemporary societies; and methodological issues in studying food habits and assessing nutritional status. Among the topics that may be addressed are: social, cultural, and psychological factors involved in eating disorders; infant feeding cross-culturally; causes of malnutrition in the Third World as well as in developed countries; ethnic variation in food ideology and food habits; issues in the applicability of anthropometric measures to diverse populations and culturally appropriate approaches to nutritional change. Prereq: Consent of instructor. (Same as BSC 774.)

ANT 776 SEMINAR IN DEPENDENCY BEHAVIOR. (3)
The course is designed to explore theories of dependency behavior by examining the concept of dependency as it can be applied to the study of various phenomena including alcohol use and abuse; dependence on other psychoactive substances; institutional dependency; dependency in work settings; and poverty and welfare. Prereq: Consent of instructor. (Same as SOC/PSY/BSC 776.)

ANT 790 RESEARCH PROBLEMS IN ANTHROPOLOGY. (1-6)
Intensive study in the fields of physical anthropology, archaeology and ethnology with qualified staff members. May be repeated to a maximum of nine credits. Prereq: Admission into the graduate program.

APP Appalachian Studies

APP 200 INTRODUCTION TO APPALACHIAN STUDIES. (3)
A multidisciplinary introduction to Appalachian culture, history and society. Examines how Appalachia came to be viewed as a distinct region; looks at its place in American life.

ARC Architecture

ARCHITECTURAL STUDIO SEQUENCE
ARC 825 DRAWING STUDIO I. (1)
Focuses on the rigorous of observational drawing. Structure, contour, line, and color are explored through study of the human body with attention to their application to the architectural experience. Studio, three hours per week. Prereq: Admission to the College.

ARC 826 DRAWING STUDIO II. (1)
A continuation of Drawing Studio I with further development of the themes of two-dimensional representation integral to the architectural experience. Studio, three hours per week. Prereq: ARC 825.

ARC 827 REPRESENTATION. (2)
Application of principles of trigonometry, Euclidean geometry, and descriptive geometry to representation. Attention to isometric, axonometric, perspective, and other representations of space. Prereq: ARC 861 and MA 112.

ARC 860 TECHNICS AND KINEMATICS I. (2)
Full-scale, three-dimensional construction, investigations of two-dimensional expression, analysis of forms, and writing as the means to explore theoretical constructs. Lecture, one hour; studio, two hours per week. Prereq: Admission to the College.

ARC 861 BASIC ARCHITECTURAL DESIGN I. (4)
Exploration of varieties of architectural experiences through tectonics and individual experimentation. Studio, eight hours per week. Prereq: Admission to the College of Architecture.

ARC 862 BASIC ARCHITECTURAL DESIGN II. (4)
A continuation of Basic Architectural Design I with further exploration of tectonics and experimentation as vehicles for the creation of architectural experiences. Studio, eight hours per week. Prereq: ARC 861 with at least a grade of C.
ARC 863 ARCHITECTURAL DESIGN STUDIO I: MODERN SPACE. (6)
Offers the student an understanding of architectural language based on the new hypotheses about space proposed by Cubism and Neoplasticism. Projects explore their aesthetic and poetic possibilities, with an emphasis on coherence in space, structure, and program. Studio, twelve hours per week. Prereq: ARC 862 with at least a grade of C.

ARC 864 ARCHITECTURAL DESIGN STUDIO II: SINGLE AND MULTIPLE OBJECTS. (6)
Extends the consideration of the issues related to the isolated object to that object upon its multiplication, introduces the issues of site and context, and focuses attention on strategies to obtain thematic unity in a manner that enables the student to develop an architectural language. Studio, twelve hours per week. Prereq: ARC 863 with at least a grade of C.

ARC 865 ARCHITECTURAL DESIGN STUDIO III: CONTEXT. (6)
Emphasizes the problems of site and context and the way they influence the specificity of the object as well as the programmatic strategies. Studio, 12 hours per week. Prereq: ARC 864 with at least a grade of C.

ARC 866 ARCHITECTURAL DESIGN STUDIO IV: TRANSFORMATION AT THE LARGE SCALE. (6)
Explores the relationship between one type of unit and another, between a type of unit and a series, between the aggregation of a series and the structural integrity and unity of a building, and between a building’s image, scale, and context. Studio, 12 hours per week. Prereq: ARC 865 with at least a grade of C.

ARC 867 ARCHITECTURAL DESIGN STUDIO V: COMPLEX PROGRAM IN COMPLEX CONTEXT. (6)
Explores the dialogue between the functional requirements of a complex program and its context through a consideration of the program and the constraints of the site and a detailed development of a portion of the project. Studio, twelve hours per week. Prereq: ARC 866 with at least a grade of C.

ARC 868 ARCHITECTURAL DESIGN STUDIO VI: A PIECE OF THE CITY. (6)
Confronts the problem of the design of public space in the urban and/or suburban fabric of the city and explores the transformation of a fragment of the city through a socially responsive project. Studio, twelve hours per week. Prereq: ARC 867 with at least a grade of C.

ARC 869 ARCHITECTURAL DESIGN STUDIO VII: READING THE OBJECT. (6)
Presents the theme of an object with restrained scale in order to permit the evaluation and refinement of the knowledge, methods of design, and skill at the student’s disposal after four years of study. Studio, twelve hours per week. Prereq: ARC 868 with at least a grade of C.

ARC 870 ARCHITECTURAL DESIGN STUDIO VIII: RECAPITULATION. (6)
A continuation of the evaluation and refinement of knowledge, methods of design, and skills, which was begun in ARC 869 with the opportunity for independent investigation. Studio, twelve hours per week. Prereq: ARC 869 with at least a grade of C.

ARC 901 ARCHITECTURAL DESIGN THESIS (6)
Supervised individual exploration of an architectural problem which permits the student to demonstrate his competence as a designer of buildings and to formalize a coherent personal view of architecture. Studio, twelve hours per week. Prereq: ARC 869 and ARC 899 with at least grades of C.

HISTORY AND THEORY OF ARCHITECTURE SEQUENCE

ARC 101 INTRODUCTION TO ARCHITECTURE. (3)
An introductory course for students not enrolled in the College of Architecture. Familiarizes students with the profession with emphasis on understanding architectural theory, design, and practice through the study of critical issues in architecture and their relationships to society and culture.

ARC 120 INTRODUCTION TO THE HISTORY AND THEORY OF ARCHITECTURE. (3)
Introduces recurrent themes in the history and theory of architecture through an examination of seminal examples from different cultures in various historical periods and serves as an introduction to surveys of the history and theory of architecture. Prereq: Admission to College of Architecture or permission of dean.

ARC 121 HISTORY AND THEORY OF ARCHITECTURE I. (3)
The first of four courses in the survey of the history and theory of architecture in the West, with attention to the achievements in Mesopotamia and Egypt, the empires of the Greeks and Romans, and medieval Europe. Prereq: ARC 120.

ARC 222 HISTORY AND THEORY OF ARCHITECTURE II. (3)
Introduces the architecture of the Renaissance and baroque architecture, with emphasis on the seminal Italian contributions as a basis for the investigation of regional varieties elsewhere and the influence of the heritage on contemporary issues in design. Prereq: ARC 121.

ARC 223 HISTORY AND THEORY OF ARCHITECTURE III. (3)
Introduces the developments in architecture and theory in the Enlightenment, the nineteenth century, and the early twentieth century. Prereq: ARC 222.

ARC 324 HISTORY AND THEORY OF ARCHITECTURE IV. (3)
Continues the investigations of the history and theory of architecture in the twentieth century. Prereq: ARC 223.

ARC 325 THEORIES OF URBAN FORM. (3)
An investigation of the factors and a consideration of the theories which have affected urban form.

ARC 820 STUDIES IN HISTORY AND THEORY OF ARCHITECTURE I: THEORIES. (3)
A series of seminars devoted to investigations of theories of architecture. Prereq: ARC 324.

ARC 821 STUDIES IN HISTORY AND THEORY OF ARCHITECTURE II: URBAN FORM. (3)
A series of seminars devoted to investigations of topics in urban forms. Prereq: ARC 325.

ARC 822 STUDIES IN HISTORY AND THEORY OF ARCHITECTURE III: TECHNIQUES. (3)
A series of seminars devoted to investigations of the means by which architecture is made. Prereq: ARC 324.

†ARC 823 INDEPENDENT STUDY IN HISTORY AND THEORY OF ARCHITECTURE IV.

STRUCTURAL DESIGN AND ANALYSIS

ARC 830 STRUCTURAL DESIGN AND ANALYSIS I. (3)
Conception of building forms and behaviors as total structural systems and major subsystems. The use of mathematics and physics to determine forces, stresses, and deformations in structural systems. Prereq: MA 109 or 123, MA 112 and PHY 201 or their equivalents.

ARC 831 STRUCTURAL DESIGN AND ANALYSIS II. (3)
A continuation of ARC 830 with an introduction to computer-aided analysis. Prereq: ARC 828 and ARC 830.

ARC 832 STRUCTURAL DESIGN AND ANALYSIS III. (3)
Design of steel structures and timber structures. Prereq: ARC 831.

ARC 833 STRUCTURAL DESIGN AND ANALYSIS IV. (3)
Design of reinforced concrete structures, masonry structures, and foundations. Prereq: ARC 832 or consent of instructor.

MATERIALS AND METHODS OF CONSTRUCTION

ARC 829 MATERIALS AND METHODS OF CONSTRUCTION. (3)
Introduces the art and and technical of building, with attention to their influence on the formal language of architecture. Considerations of the properties of materials and methods of construction through analyses of selected works, lectures, and tours of construction sites.

ARC 836 BUILDING SYSTEMS INTEGRATION. (3)
A continuation of ARC 829, with an emphasis on the integration of materials, structural systems, and environmental controls. Detailed investigations of the interpretation and employment of materials and systems of construction, with attention to the manner in which they order architecture. Prereq: ARC 829 and ARC 835; coreq: ARC 833.
ENIRONMENTAL CONTROLS
ARC 834 ENVIRONMENTAL CONTROLS I. (3)
Introduces concepts of the luminous, thermal, and acoustical environment and the mechanical and electrical systems of buildings. Prereq: PHY 203.

ARC 835 ENVIRONMENTAL CONTROLS II. (3)
A continuation of ARC 834. Prereq: ARC 834.

PROFESSIONAL PRACTICE
ARC 850 PROFESSIONAL PRACTICE. (3)
Professional and ethical responsibility to profession and community; procedural matters pertaining to practice and management.

ADVANCED ARCHITECTURAL PROBLEMS SEQUENCE
ARC 828 COMPUTERS AND ARCHITECTURE. (3)
Introduces computers with an emphasis on the exploration of their applications in architecture. Students will be exposed to the creative potential of computers in design as well as to their analytic capabilities. Lecture, two hours; laboratory, three hours per week.

ARC 899 THESIS RESEARCH. (3)
Supervised investigation which is intended to identify the salient issues which will be addressed in the thesis and to provide a rationale for the student’s approach to these issues. Prereq: ARC 868 with at least a grade of C and approval of the faculty advisor for the thesis.

*ARC 912 INDEPENDENT STUDY. (3)
Supervised, independent investigations of selected topics in architecture. May be repeated to a maximum of nine credits when topics differ sufficiently. Prereq: Consent of instructor.

†ARC 914 SEMINAR ON SPECIAL PROBLEMS IN ARCHITECTURE.
†ARC 920 PROGRAM IN CONTEMPORARY ARCHITECTURAL HISTORY.
†ARC 922 SEMINAR ON HOUSING.
ARC 963 SELECTED TOPICS IN ARCHITECTURE (Subtitle required). (3)
Seminars and workshops for investigations of selected topics in architecture. May be repeated to a maximum of nine credits when topics differ sufficiently. Prereq: Consent of instructor.

†ARC 964 ADVANCED SPECIAL PROBLEMS IN ARCHITECTURE II.

ART

ART 100 INTRODUCTION TO ART. (3)
This course is open to all University students interested in an understanding and appreciation of the visual arts. The formal and expressive qualities of major art forms are examined through lectures and presentations.

ART 191 ART PROFESSIONS. (1)
Lectures and discussions on the various art professions as they affect the student, the professional artist, the art historian, the art educator, and the community. May be repeated to a maximum of eight hours.

†ART 501 BASIC MUSEUM TRAINING: HISTORICAL ART.
†ART 502 BASIC MUSEUM TRAINING: CONTEMPORARY ART.
ART 748 MASTER’S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

ART 768 RESIDENCE CREDIT FOR MASTER’S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

AS Aerospace Studies

AS 111 AEROSPACE STUDIES I, AFROTC. (1)
A course designed to provide the student with a basic understanding of the nature and principles of war, national power, and the Department of Defense role in the organization of national security. The student also develops leadership abilities by participating in a military organization, the cadet corps, which offers a wide variety of situations demanding effective leadership.

AS 112 AEROSPACE STUDIES II, AFROTC. (1)
A course designed to provide the student with a basic understanding of the contribution of aerospace power to the total U.S. strategic offensive and defensive military posture. The student also develops leadership abilities by participating in a military organization, the cadet corps, which offers a wide variety of situations demanding effective leadership.

AS 113 LEADERSHIP SEMINAR. (1)
A course designed for development of basic skills required to be a manager, including communications, human relations, and administration of equal opportunity. Credit will not be granted toward the hours requirements for the degree. Pass/fail only. Prereq: Enrollment in AS 111.

AS 114 LEADERSHIP SEMINAR. (1)
A continuation of AS 113. A course designed to develop managerial skills including superior/subordinate relationships, communications, customs and courtesies, basic drill movements and career progression requirements. Credit will not be granted toward the hours requirements for the degree. Pass/fail only. Prereq: Enrollment in AS 112.

AS 211 AEROSPACE STUDIES II, AFROTC. (1)
Introduces the study of air power from a historical perspective; focuses on the development of air power into a primary element of national security. Leadership experience is continued through active participation in the cadet corps. Lecture, one hour; leadership laboratory, one hour. Prereq: AS 111, 112 or PAS approval.

AS 212 AEROSPACE STUDIES II, AFROTC. (1)
Provides a foundation for understanding how air power has been employed in military and non-military operations to support national objectives. Examines the changing mission of the defense establishment, with particular emphasis on the United States Air Force. Leadership experience is continued through participation in the cadet corps. Lecture, one hour; leadership laboratory, one hour per week. Prereq: AS 111, 112 or PAS approval.

AS 213 LEADERSHIP SEMINAR. (1)
A course designed for development of advanced skills required to be a manager/leader, including leadership styles, public speaking, group dynamics, motivation and preparation for field training. Credit will not be granted toward the hours requirements for the degree. Pass/fail only. Prereq: Enrollment in AS 211.

AS 214 LEADERSHIP SEMINAR. (1)
A continuation of AS 213. A course designed to develop supervisory management skills to include communications, techniques of critique, social actions, personnel evaluation procedures, problem solving, role playing and field training preparation. Credit will not be granted toward the hours requirements for the degree. Pass/fail only. Prereq: Enrollment in AS 212.

AS 331 AEROSPACE STUDIES III, AFROTC. (3)
A study of management functions with emphasis on the individual as a manager in an Air Force environment. Individual motivational and behavioral process, communications, and group dynamics are included to provide a foundation for the development of professional skills as an Air Force Officer. Students refine their leadership and managerial abilities by organizing and managing a quasi-military unit. Prereq: Acceptance into POC or approval of PAS.

AS 332 AEROSPACE STUDIES III, AFROTC. (3)
A study of leadership with specific emphasis on the Air Force leader. Includes theoretical, professional and communicative aspects. In addition, military justice and administrative law are discussed within the context of the military organization. Students continue to develop and refine their leadership abilities by organizing and managing a military unit, the cadet corps, which offers a wide variety of situations requiring effective leadership. Prereq: AS 331 or approval of PAS.

AS 333 LEADERSHIP LABORATORY. (0)
Laboratory to accompany AS 331 or AS 332. Pass/fail only.
ASC 341 AEROSPACE STUDIES IV, AFROTC. (3)
A study of the military profession, civil-military interaction, communicative skills, framework of defense policy, and formulation of defense strategy. Students refine their leadership abilities by organizing and managing a military unit, the cadet corps, which offers a wide variety of situations requiring effective leadership. Prereq: ASC 331, 332 or approval of PAS.

ASC 342 AEROSPACE STUDIES IV, AFROTC. (3)
Continues the study of strategy and the management of conflict, formulation and implementation of U.S. defense policy, defense organization, and case studies in defense policy making. Students also refine their leadership abilities by organizing and managing a military unit, the cadet corps, which offers a wide variety of situations requiring effective leadership. Prereq: ASC 331, 332, or approval of PAS.

ASC 343 LEADERSHIP LABORATORY. (0)
Laboratory to accompany AS 341 or AS 342. Pass/fail only.

ASC 395 INDEPENDENT WORK. (2-6)
A study of an advanced problem on subject area in aeronautical science under the guidance of a departmental staff member. One discussion per week; term paper required. Prereq: Senior standing in AFROTC Program; major and 3.0 standing in Aerospace Studies.

ASC 301 LIVESTOCK SELECTION AND EVALUATION. (3)
Introduction to the selection and evaluation of farm animals. Prereq: ASC 106 or FSC 107.

ASC 302 LIVESTOCK SELECTION AND EVALUATION. (3)
Selection principles of purebred and commercial beef cattle, sheep, swine and horses. Evaluation of live animal and carcass characteristics of beef cattle, sheep and swine. Emphasis placed on oral reasons. Laboratory, six hours. Not open to freshmen. Prereq: ASC 106 or equivalent.

ASC 303 EVALUATION AND GRADING OF MEATS. (3)
A fundamental study of the nutrients, their utilization and their role in the animal. Prereq: CHE 230 or 236.

ASC 304 Poultry Production. (3)
A study of the application of avian biology to modern poultry production. Topics include anatomy, physiology, reproduction, incubation and embryonic development, breeding and genetics, nutrition and feeding, disease control, housing and environmental control, management, poultry and egg products, and the structure of the poultry industry. For majors and non-majors. Prereq: ASC 106 or equivalent.

ASC 305 GENETICS. (3)
The basic principles of heredity as currently understood from evidence accumulated in classical, cytogenetic, molecular, and quantitative genetic experiments. Emphasis is placed on a thorough understanding of genetic principles and the relationship of genetics to all biological disciplines. Prereq: Six credits in biological sciences and one course in general chemistry. (Same as AGR/ENT 340.)

ASC 306 ANIMAL BREEDING. (3)
Study of roles of selection and mating systems for production of genetically superior livestock populations. Prereq: ASC 305.

ASC 307 MEAT SCIENCE. (5)
A historical perspective of the meat industry together with major changes in body type and composition in both the live animal and its end product meat. Students will evaluate live market animals (swine, cattle, sheep) and follow their carcasses and cuts through fabrication and distribution channels. Major topics of discussion will focus on growth and development, inspection, grading, physical and chemical composition of meat and post-mortem changes that affect meat quality. Additional information will cover meat marketing trends, nutrition, meat cookery, meat selection, health issues and consumer information. Prereq: ASC 106 or FSC 107.

ASC 308 REPRODUCTIVE PHYSIOLOGY OF FARM ANIMALS. (3)
Introduction to the anatomical and physiological processes of farm animal reproduction. Evaluation of management procedures as they relate to reproductive physiology. Prereq: GEN 106, BIO 104, CHE 230 or CHE 236.

ASC 309 ANIMAL NUTRITION. (3)
A fundamental study of the nutrients, their utilization and their role in the animal. Prereq: CHE 230 or 236.

ASC 310 FEEDS AND FEEDING. (3)
The composition and nutritional characteristics of common feedstuffs. The digestive systems, nutritional requirements, formulated rations and economical feeding programs for farm animals. Lecture, two hours; laboratory, two hours. Prereq: ASC 378.

ASC 311 ADVANCED EQUINE EVALUATION. (1)
Advanced study of conformation and performance in the horse. Selection of horses of different breeds based on conformation, breed character and movement. Emphasis will be placed on developing a knowledge of industry standards and preparation of oral reasons. Prereq: ASC 310.

ASC 312 ADVANCED LIVESTOCK SELECTION AND EVALUATION. (2)
Selection of purebred and commercial beef cattle, sheep, swine and horses. Special emphasis on oral reasons, livestock contest procedures and herd improvement principles. Laboratory, six hours. Prereq: ASC 301 or consent of instructor.

ASC 313 EQUINE MANAGEMENT. (3)
Study of the basic principles associated with horse management. Topics will include equine behavior, equine diseases and herd health programs, facilities and environmental management, nutrition and feeding management. Prereq: ASC 106 and ASC 120.

ASC 314 DAIRY CATTLE SELECTION AND EVALUATION. (2)
Selection of purebred and commercial dairy cattle, sheep, swine and horses. Special emphasis on oral reasons, livestock contest procedures and herd improvement principles. Laboratory, six hours. Prereq: ASC 301 or consent of instructor.

ASC 315 ADVANCED DAIRY CATTLE SELECTION AND EVALUATION. (1)
Evaluation of dairy cattle for type characteristics. Laboratory, four hours.

ASC 316 ADVANCED DAIRY CATTLE MANAGEMENT. (2)
Study of production areas of the world; relationships between live animal merit and yield of retail cuts of meat; identification of skeletal components; identification and functions of reproductive and digestive tracts; characters of breeds of beef and dairy cattle, sheep, swine, poultry and horses.

ASC 317 ADVANCED LIVESTOCK SELECTION AND EVALUATION. (1)
Advanced study of conformation and performance in the horse. Selection of horses of different breeds based on confirmation, breed character and movement. Emphasis will be placed on developing a knowledge of industry standards and preparation of oral reasons. Prereq: ASC 310.
ASC 404G SHEEP SCIENCE. (4)
History and importance of the sheep industry; application of the principles of selection, breeding, feeding and management of sheep for efficient lamb and wool production. Lecture, two hours per week; laboratory, four hours per week. Prereq: ASC 300, ASC 362, ASC 364 and ASC 380 or consent of instructor.

ASC 406 BEEF CATTLE SCIENCE. (4)
Scope and importance of the beef cattle industry; roles of the major cattle breeds and organizations associated with the beef cattle industry; application of equipment, identification, nutrition, reproduction, genetics, health, marketing, taxation and management principles to beef cattle production; impact of current economic, social and environmental issues on the beef cattle industry. Prereq: ASC 300, ASC 362, ASC 364, ASC 380.

ASC 408G SWINE SCIENCE. (3)
A study of scope and importance of the swine industry. The application of the principles of selection, reproductive physiology, breeding, nutrition, housing, environment and management to the modern production of swine. Lecture, two hours; laboratory, two hours. Prereq: ASC 300, ASC 362, ASC 364, and ASC 380.

ASC 410G HORSE SCIENCES. (3)
Detailed study of the anatomy and physiology of the horse as they relate to the nutrition, reproduction, athletic ability, unsoundness and control of diseases and parasites. Lecture, two hours; laboratory, two hours. Prereq: ASC 362, ASC 364, ASC 380.

ASC 420G DAIRY CATTLE SCIENCE. (3)
Scope and importance of the dairy cattle industry; selection, breeding, housing, feeding and management of dairy cattle. Lecture, two hours; laboratory, two hours. Prereq: ASC 362, ASC 364, and ASC 380.

ASC 462G ARTIFICIAL INSEMINATION AND FERTILITY OF FARM ANIMALS. (2)
A course designed to acquaint students with current methods of applying artificial insemination to the improvement of farm animals with special reference to cattle. Emphasis will be on management of herds for maximum fertility. Lecture, one hour; laboratory, two hours per week. Prereq: ASC 364 and permission of instructor.

ASC 470 CAPSTONE FOR ANIMAL AGRICULTURE. (3)
Discussion of the importance of livestock production to society and consideration of major issues impacting animal agriculture. Principles and practices learned in disciplinary and commodity Animal Sciences courses are integrated into a unified perspective, and the scientific method is employed as an approach to problem analysis and resolution. Refinement of skills in critical thinking, information gathering, writing, and oral communication is emphasized. Prereq: Senior standing in College of Agriculture, Animal Sciences major.

ASC 564 MILK SECRETION. (3)

ASC 580 PRINCIPLES OF ANIMAL NUTRITION. (3)
The chemistry and physiology of animal nutrition and the nutritive requirements for growth, fattening, reproduction, lactation, and other body functions, Prereq: ASC 378 and ASC 380 or graduate standing.

ASC 601 MAMMALIAN ENDOCRINOLOGY. (3)
An introduction to the basic anatomy, physiology and biochemistry of endocrine systems with emphasis on mechanisms of hormone synthesis, secretion and action. Lectures and reading assignments will focus on endocrine function in mammalian species, including laboratory animals, humans and livestock. Prereq: BCH 401G and BIO 350 or equivalents. (Same as PGY 601.)

ASC 630 ADVANCED MEAT SCIENCE. (4)
Advanced meat science with special reference to the histological, chemical, physical and microbiological properties as they relate to meat quality, organoleptic acceptability and processing procedures. Lecture, three hours; laboratory, two hours. Prereq: ASC 300, ASC/FSC 306 or equivalent; one course in histology or biochemistry or consent of instructor. (Same as FSC 630.)

ASC 660 PHYSIOLOGY OF REPRODUCTION. (3)

ASC 664 ADVANCED ANIMAL BREEDING. (3)
Advanced study of selection and mating system theory applicable to production of genetically superior livestock populations. Prereq: ASC 362 and STA 570; STA 671 and STA 672 desirable.

ASC 680 LABORATORY METHODS IN NUTRITIONAL SCIENCES. (4)
The use of laboratory techniques and instrumentation in the solution of fundamental problems of nutrition. Lecture, one hour; laboratory, six hours. (Same as NS 680.)

ASC 681 ENERGY METABOLISM. (2)
An in-depth discussion of nutritional energetics, from the standpoint of factors which influence the utilization of dietary energy. A critical review of current literature. Prereq: ASC 378 or equivalent, BCH 502 or equivalent or consent of instructor.

ASC 682 MICROBIAL ECOTOLOGY OF DIGESTION. (4)
Principles of microbiology as they relate to nutrition and digestion in ruminant and nonruminant animals. Procedures for cultivation, isolation and characterization of anaerobic bacteria from the gastrointestinal tract. Methods for measuring and evaluating microbial growth and activity in the gastrointestinal tract. Lecture, two hours; laboratory, four hours. Prereq: BIO 476G or equivalent and consent of instructor.

ASC 683 PROTEIN METABOLISM. (2)
A study of the principles and present concepts of protein and amino acid nutrition and metabolism in the animal. Prereq: Graduate level biochemistry.

ASC 684 ADVANCED RUMINANT NUTRITION. (3)
Principles of ruminant metabolism in the utilization of feedstuffs for meat, milk, and wool production. Prereq: ASC 682 and two or more courses from ASC 681, ASC 683, ASC 685 and ASC 687 or consent of instructor.

ASC 685 MINERAL METABOLISM. (2)
An in-depth review of the function, requirement deficiency and toxicity of mineral elements in nutrition. Emphasis on the interactions between elements and current literature will be made. Prereq: ASC 378 or NPS 510 or equivalent, BCH 502 or equivalent or consent of instructor. (Same as NPS 685.)

ASC 686 ADVANCED NONRUMINANT NUTRITION. (3)
A study of nutrient utilization as influenced by digestion, absorption and metabolism with emphasis on swine and poultry. Prereq: One course each in nutrition and biochemistry.

ASC 687 VITAMIN METABOLISM. (2)
Detailed study of the metabolism of vitamins and the role of vitamins in the metabolism of carbohydrates, proteins, lipids, and minerals. Prereq: BCH 502 or CHE 552 or consent of instructor.

ASC 688 EQUINE NUTRITION. (2)
Detailed study of anatomical, physiological and microbiological factors influencing the nutritive requirements of the equine for maintenance, growth, reproduction, lactation and work. Prereq: One course in nutrition and physiology or biochemistry or consent of instructor.

ASC 748 MASTER’S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

ASC 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

ASC 768 RESIDENCE CREDIT FOR THE MASTER’S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

ASC 769 RESIDENCE CREDIT FOR THE DOCTOR’S DEGREE. (0-12)
May be repeated indefinitely.

ASC 771 ANIMAL SCIENCE SEMINAR. (1)
May be repeated twice for a maximum of three credits.

ASC 780 SPECIAL PROBLEMS IN ANIMAL DERIVED FOODS. (1-4)
May be repeated for a maximum of nine credits. Prereq: Consent of graduate adviser. (Same as FSC 780.)

ASC 781 SPECIAL PROBLEMS IN GENETICS AND ANIMAL BREEDING. (1-4)
May be repeated to a maximum of nine credits. Prereq: Consent of graduate adviser.

ASC 782 SPECIAL PROBLEMS IN ANIMAL NUTRITION. (1-4)
May be repeated to a maximum of nine credits. Prereq: Consent of graduate adviser.
ASC 783 SPECIAL PROBLEMS IN REPRODUCTIVE PHYSIOLOGY (Subtitle required). (1-4)
Intensive study or investigation of topics in physiology not covered in formalized courses. May be repeated under different subtitle to a maximum of nine credits. Prereq: Consent of graduate adviser.

ASC 790 RESEARCH IN ANIMAL DERIVED FOODS. (1-6)
Problems involving original investigation. May be repeated for a maximum of nine credits. Prereq: Consent of graduate adviser. (Same as FSC 790.)

ASC 791 RESEARCH IN GENETICS AND ANIMAL BREEDING. (1-6)
Problems involving original investigation. May be repeated for a maximum of nine credits. Prereq: Consent of graduate adviser.

ASC 792 RESEARCH IN ANIMAL NUTRITION. (1-6)
Problems involving original investigation. May be repeated for a maximum of nine credits. Prereq: Consent of graduate adviser.

ASC 793 RESEARCH IN REPRODUCTIVE PHYSIOLOGY (Subtitle required). (1-6)
Original investigation of mechanisms and problems related to mammalian reproduction. May be repeated under different subtitle to a maximum of nine credits. Prereq: Consent of graduate adviser.

AST 191 THE SOLAR SYSTEM. (3)
One part of the two-semester introduction to astronomy. This course is primarily about the nature, origin, and evolution of the planets of our solar system and of their satellites. Special emphasis is given to recent spacecraft studies of the solar system. Related topics include the nature of comets, the uses of astronomical telescopes, and eclipses and other solar phenomena. Prereq: Two years of high school algebra or MA 108R concurrently.

AST 192 GALACTIC AND EXTRA-GALACTIC ASTRONOMY. (3)
One part of a two-semester introduction to astronomy. This course concentrates on the universe outside our own solar system. A principle theme is the origins and evolution of stars, of galaxies, and of the universe at large. Highlights include the nature of black holes and quasars, synthesis within stars of the chemical elements essential for life, the Big Bang model of the formation of the universe, and the possible fates of the universe. Prereq: Any AST or PHY course or consent of instructor.

AST 591 ASTROPHYSICS I - STARS. (3)
Structure of the universe - an overview: hierarchy of objects, the distance ladder. Stellar structure: hydrostatic equilibrium, energy transport, nuclear energy generation, equilibrium solutions. Stellar evolution: nucleosynthesis, evolution off the main sequence, final stages of stellar life - white dwarfs, supernovae, neutron stars and black holes. Binary stellar systems. Prereq: PHY 361, PHY 416G, PHY 417G. (Same as PHY 591.)

AST 592 ASTROPHYSICS II - THE GALAXY. (3)
Interstellar matter: gas and dust, interstellar reddening, absorptions lines, 21 cm observations. Phases of the interstellar medium: HII regions, atomic and molecular clouds. Star formation. Stellar populations. Galactic structure and dynamics: the galactic nucleus, spiral structure, rotation curve, dark matter. Prereq: PHY 591. (Same as PHY 592.)

AST 593 PHYSICAL PROCESSES IN ASTROPHYSICS. (3)
A lecture and problem course covering the physical processes encountered in astrophysics. The topics covered will include micro-physical processes in stellar atmospheres and the interstellar medium, high-energy astrophysics, and basic hydrodynamics and shock waves. Prereq: PHY/AST 592 or consent of instructor. (Same as PHY 639.)

AST 639 PHYSICAL PROCESSES IN ASTROPHYSICS. (3)
A lecture and problem course covering the physical processes encountered in astrophysics. The topics covered will include micro-physical processes in stellar atmospheres and the interstellar medium, high-energy astrophysics, and basic hydrodynamics and shock waves. Prereq: PHY/AST 592 or consent of instructor. (Same as PHY 640.)